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**IMPACT OF FOREGIN DIRECTINVESTMENT ON ECONOMIC
GROWTH IN ETHIOPIA**

BY: - MANDEFRO GEDEFAW ALEMU

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IMPACT OF FOREIGN DIRECT INVESTMENT ON ECONOMIC GROWTH IN ETHIOPIA

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BY: - MANDEFRO GEDEFAW ALEMU

ADVISOR

Dr. ADEM KEDIR (PhD)

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APPROVAL OF BOARD OF EXAMINATIONS
COLLAGE OF BUSSINES AND ECONOMIC
ADAMA SCIENCE AND TECHNOLOGY
UNIVERISTY

As thesis advisor, I hereby certify that I have read and evaluated this research work contribution, under my guidance, by **Mandefro Gedefaw Alemu** entitled “**Impact of Foreign Direct investment on Economic Growth in Ethiopia**”. I recommend that it has to be submitted as fulfilling the thesis requirement.

Dr Adem Kedir (PhD) _____

Major advisor

Signature

Date

As member of board of examiners of the M.Sc. Thesis open defense examination, we certify that we have read and evaluated the thesis prepared by **Mandefro Gedefaw Alemu** entitled “**Impact of Foreign Direct investment on Economic Growth in Ethiopia**” and examined the candidate. We recommended that it has to be accepted as fulfilling the thesis requirements for the degree of masters of Science in Economics major with Development Economics.

Name of Chairperson

Signature

Date

Name of Internal Examiner

Signature

Date

Name of External Examiner

Signature

Date

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LIST OF ACRONYMS

ADF	Augmented Dickey Fuller
DCs.....	Development Countries
DI.....	Domestic Investment
EEA	Ethiopian Economic association
FDI.....	Foreign Direct Investment
GDP.....	Gross Domestic Product
IMF.....	International Monetary Fund
IV	Instrumental Variable
LDCs	Less Development Countries
MNC.....	Multinational Corporations
MNE	Multinational Enterprises
NBE.....	National Bank of Ethiopia
OLI	Ownership, Location, and Internationalization
PP	Phillies Perron
TNC.....	Trans National Corporations
UNCTAD.....	United Nations Conference on Trade and Development
EU.....	European Union
U.S.	United State
US\$	United states Dollar
WIR	World Investment Report
OLS.....	Ordinary Least Square
UNESCO.....	United Nations Educational, Scientific and Cultural Organization
WB.....	World Bank

ABSTRACT

This study examines the impact of foreign direct investment on economic growth of Ethiopia using annually collected time series data for 1980/81-2014/15. Economic growth is representations by real gross domestic product and foreign direct investment proxies by the inflow of foreign direct investment. Other control variables such as fixed capital formation and export have been incorporated. A unit root test was used to determine whether or not the data was stationary. The Johansen co-integration test was then used to test for co-integration. Additionally the Granger causality procedure was used to test the direction of causality between foreign direct investment and economic growth. In order to fully account for feedbacks, a vector autoregressive model is utilized. It was exposed that all the variables were non-stationary in level and first difference form but were all found to be stationary after second differencing. Further, the variables were integrated of order two, $I(2)$. The results show that there is a stable, long-run relationship between foreign direct investment and economic growth in Ethiopia from the period 1980/81-2014/15. because that, a unit increase in the FDI encourages on average, leads to an increase of about 4.157028 units in GDP. The pair-wise Granger causality result shows that there is a unidirectional causality that runs from FDI to economic growth of Ethiopia. The results indicate that foreign direct investment has highly significant positive effect on economic growth. Hence, the researcher therefore recommend that, FDI facilitate economic growth, so the government has to apply much effort in order to attract more FDI into the country.

Keywords: *Ethiopia, Foreign Direct Investment, Economic Growth, Stationarity, Co-integration, Vector Error Correction Model, Granger Causality.*

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

Foreign direct investment (FDI) is gradually significant network for resource flows between the developed and developing countries. It affects economic growth of developing countries positively through transfer of technology, capital, improved managerial skills, and know-how, productivity, job creations, entrepreneurial ability and access to markets (Li and Liu (2005).most countries seek to attract FDI through their attractive frameworks. In this sense the attraction has become an obvious objective of economic policy both in developed and developing countries. Generally foreign direct investment is a phenomenon resulting from globalization, which involves the integration of the domestic economic system with global market. It is accomplished through opening up of the local economic sector as well as domestic capital for foreign investors to establish business, within the economy.

Most countries attempt to attract FDI, because of its positive implication as a tool of economic development. That means the attitude of many developing countries towards the importance of FDI has changed remarkably and action has been taken by these countries to ease restriction on their inflow. The policy designed by developing countries towards FDI is based on the assumption that increases the country's output, productivity and produce externalities and technology transfer (Damooei and Tavakoli, 2006). FDI has been directed by the multinational enterprise (MNE) into the economies of the developing world. Theoretically, FDI in the slow growth model promotes economic growth by increasing the volume of investment, raise economic growth by generating technological diffusion from developed countries to developing countries, because the absence of appropriate technology and financial resource is obstructing for development (Borensztein, Gregorio & Lee, 1998).

Globally, beginning from this mid- 1980s, FDI has grown much faster than either trade or income. For instance, between 1985 and 1997 while worldwide nominal Gross Domestic Product (GDP) increased at a rate of 7.2 per cent per year, worldwide imports at 9.2 per cent, and the worldwide nominal inflows of FDI increased at 17.6 percent (Friedman, 2000). Considering the benefits of FDI for growth and development, most African countries have undertaken varies policy reforms to create conducive investment environment in order to attract a considerable

amount of FDI. According to the United Nations Conference on Trade and Development (UNCTAD) of 2005 world investment report, the average annual FDI flows to Africa doubled during the 1980s to 2.2 billion US\$ compared to the 1970s, but increased significantly to 6.2US\$ Billion and \$13.8 Billion respectively during the 1990s and 2000–2003. However, it is low compared to other developing regions. FDI inflows to the continent amounts to 36 Billion US\$ in 2006, which was 20% higher than the previous record of \$30 Billion in 2005 and twice the 2004 value of \$18 Billion and rose to a historic value of \$53 Billion in 2007 (UNCTAD,2008).

Moreover, recently (2009–2010) the trends of FDI flow to developing countries has been the main source of capital inflows with greater stability and productive investment. The total FDI inflow to these developing countries was 579 Billion US\$ in 2005, this figure has increased to 1095 Billion US\$ in the 2010, however, African share was ten percent and the flow is characterized by uneven distribution among countries in the region (UNCTAD, 2011). Commonly, FDI it assumed to be benefiting for a poor country economic growth, like Ethiopia. The total FDI inflows in to Ethiopia have increased continuously from 135 million US\$ in 2000 up to 545 US\$ in 2004.

According to World Investment Report (WIR) of 2012, Ethiopia is one of the developing countries receiving diversified FDI. It has been categorized among countries receiving annual FDI ranging between 100 and 499 Million US\$. An academic and policy area, the issue related to FDI is not only attracting a significant amount of foreign capital but also its likely impact on host economy. There has been a long debate in the literature on effect of foreign direct investment on host economy like Ethiopia. The expected impact of FDI on the receivers countries remains more argumentative in empirical than the theoretically leaving blind spots on FDI as cure for development problem of developing countries. As result, in the recent literature attentions are diverted to the impact of FDI on host country.

The main idea underlying the FDI liberalization policies of many developing countries and FDI promotion efforts of international donors such as WB and IMF is the view that FDI inflows foster economic growth. Theoretical arguments assign a key role for FDI in economic growth. While these theoretical arguments are quit straightforward and widely accepted, the empirical evidence is much more ambiguous, or as De Mello (1997) puts it: “whether FDI can be believed to be a catalyst for output growth, capital accumulation and technological progress, appears to be

a less controversial hypothesis in theory than in practice” The empirical macro-economic literature shows a clear link between FDI and GDP growth but the direction of causality is not always clear (Carkovic and Levine, 2002; Nunnenkamp, 2003). Also when the heterogeneity of the host economies is recognized in empirical studies, the link between FDI inflows and growth becomes ambiguous (Nunnenkamp, 2003). Economic theory predicts FDI to create growth multiplier effects through vertical and horizontal spillover effects; including the transfer of technology and know-how to domestic firms, the formation of human capital, etc. In addition to these advantages; some points which supports the concept that FDI promotes growth are explained by, Agrawal and Khan (2011)

1. FDI acts as a means of transportation for transfer of advanced manufacturing technologies from DCs to the LDCs,
2. FDI increase competition in the host country’s markets.
3. FDI helps the host countries improve their foreign exchange reserves (or balance-of payments position) by increasing exports,
4. FDI brings along with it the management know-how needed to runs the facilities,
5. FDI provides the financial resources needed by the host country,
6. FDI enhances the training and employment opportunities for the people of LDCs,
7. FDI reduces the burden of imports on the host countries through import substitution and
8. FDI acts as catalyst for increasing domestic savings and investment.

As a result of these benefits, many developing countries are now actively seeking for promoting FDI by trying to create a favorable environment for it. So Ethiopia is one of them in order to offers attractive investment opportunities for foreign companies and has adopted a number of policies to attract foreign direct investment into the country. Some of the measures taken include economic and political reforms aiming at macroeconomic and political stability, investment in infrastructure and human capital and liberalization of trade (Haile and Assefa 2006).

Therefore, this paper seeks to analyze FDI inflows into Ethiopia and to investigate its effect on economic growth empirically. This gives scope for necessary policy initiative in terms of attracting more FDI to sector which the country has a competitive advantage. So this paper

focuses on the FD-led growth hypothesis in the case of Ethiopia. The study is based on time series data from 1980/81-2014/15.

1.2 Statement of the problem

From the international viewpoint, the relationship between FDI and economic growth, and the stability of this growth, is essential reflections of the host countries evaluate the trade-offs associated with foreign access. This has been considered in the context of longer term performance, stemming from the argument by Romer (1993) that an idea gap has held back growth in emerging markets. If an idea gap has obstructed growth, FDI can bring a catch-up on or examine the process. Investment in general is realized as one of the host important variables in driving economic growth and development. Hence, FDI is believed to help as a strong instrument for the reinforcement and spread of business opportunities throughout developing and industrialized economies thereby enhancing economic development. It has been argued in several studies that FDI contributes positively to economic development in host economies.

Generally Foreign Direct Investment (FDI) is considered as an option for financing development both in developed and developing countries. This is mostly true where FDI brings invisible financial resources and fills the gap between desired investment and domestically mobilized savings, when it facilitates technology transfer and entry into export markets, as well as strengthens the export capabilities of the host country resulting in productivity gains (Caves 2007; Ayanwale, 2007; Borensztein et al, 1998).

Conversely, some Studies conducted in developing countries in particular are found to be contradicting or opposing with the above facts. Many researchers argue that FDI has an adverse effect on development. They argue increased FDI does not always contribute to upgrading but sometimes may even act to reduce the host country's long run potential, leading to a crowding-out affect whereby domestic firms are displaced or outcompeted by foreign-owned and hence affecting economic development negatively (Mwlima, 2003, Athukorala, 2003). As a result, the role of FDI in promoting growth and curative development problems became controversial.

The agreement in the literature appears to be that FDI increase growth through productivity and efficiency gains by local firms. The empirical evidence is not common; however, available evidence for developed countries appears to support the idea that the productivity of domestic firms is positively related to the existence of foreign firms (Globeram, 1979). The results for

developing countries are not so clear, with some finding positive spillovers (Blomstrom, 2000) reporting limited evidence. Still others find no evidence of positive short run spillover from foreign firms. Some of the reasons offered for these mixed results are that the functional forward and backward linkages may not necessarily be there (Aitken et.al.1999). Further, the role of FDI in export promotion remains controversial and depends crucially on the motive for such investment (World Bank, 1998).

In general, the above conflicting evidence is not exception to Ethiopian economy. Because, the vast body of literature states that FDI helps to promote economic growth through various channels. Exactly, **three** main channels can be detected through which FDI affected growth: Increase capital accumulation, Raises level of knowledge or skill, and Increase competition of firms in the host country. With these assumption, developing countries are selecting for policies to attract FDI to block their development financing gap (Razafimahefa and Hamori, 2007). Majority of the literature used foreign direct inflows as a proxy variable for foreign direct investment and real per capita as a measure of economic growth to test the hypothesis of positive relationship between foreign direct investment and economic growth. Among the more important time series studies, the following studies may be mentioned: P.P.Awasantha (2003), Soltani Hassen and Ochianis (2012), Kyuntae Kim and Hokyung Bang (2008), Dejene G. (2014) and Getinet and Hirut (200).

Although, Ethiopia has meaningfully improved the functioning of its market economy; on the other hand significant steps towards macroeconomic stability and structural reform are also enhancing the attractiveness of foreign investments. Nowadays Ethiopia has become attractive investment destination. According to www.ethiopianvestor.com the major reasons are: Political and social Stability, Macroeconomic stability and Growing economy, adequate guarantees and Protection, Transparent laws and efficient procedures, Abundant investment Opportunities, Abundant labor force, Wide domestic, Regional and International market opportunity, Competitive investment incentive packages, Welcoming attitude of the people to FDI, Amusing climate and Fertile soils and Low production cost.

As a result from the above attractive investment opportunity, the current Ethiopian government investment Proclamation No. 691/2010 and Article 39 of the Investment Proclamation No.769/2012 allowed foreign investors to invest in all economic sectors, except those currently

reserved for domestic private investors, state investment or joint investment with government. This study is recognize the growing confirmations from cross-country and country specific studies that the association between foreign direct investment and economic growth. Because Successful and sustainable economic growth requires continued improvement in investment and productivity. Generally the research gap was identified from Chapter two in conceptual frame work parts; this paper tries to explain whether FDI has a positive and significant impact on economic growth in Ethiopia. So it links the gap between the various empirical literatures and examining the developmental effects of FDI in Ethiopia economic growth by using a time series data over the period 1980/81-2014/15. Therefore the expected outcome from this study could also be useful in improving policy design, institutional setup, implementation, monitoring and evaluation of FDI.

1.3 Hypothesis of the study

The relationship between FDI and economic growth are hypothesized based on past grounds of theories and empirical findings. Therefore the following hypothesizes are being set to guide the study: hypothesis 1: FDI will positively relate to economic growth and significant affect economic growth measured in real gross domestic product. Hypothesis2: There will a causal relationship between FDI and real gross domestic product and the direction of causality will from FDI to real gross domestic product.

1.4 Objectives of the study

1.4.1 General Objective

The general objective of this study is examining the impact of foreign direct investment on economic growth in Ethiopia from the period 1980/81-2014/15.

1.4.2 Specific Objectives

The specific objectives of the study are:

- To identify the relationship between FDI and economic growth in Ethiopia, and
- To determine the direction of relationship between FDI and economic growth.

1.5 Research questions

The paper attempt to answer the following basic questions:

- Is there a causal relationship between foreign direct investment and economic growth in Ethiopia?
- Does foreign direct investment promote economic growth in Ethiopia?

1.6 Significance of the study

Foreign direct investment is important to most countries, because no country is self-sufficient, i.e. there is mutual interdependence among countries. And can be particularly energetic for developing countries like Ethiopia. In many instances, developing countries have both the demand for a good and service, and the labor and natural resources to supply it, but they lack the access to capital or financial resource necessary to begin producing. In the United States, most businesses start when an entrepreneur goes to a bank and takes out a loan or finance. Larger enterprises may go to an investment bank to sell stocks or bonds, to get their businesses going. But in many developing countries, like Ethiopia either bank does not exist in adequate numbers or they do not have enough capital to lend the people. Therefore, FDI provides essential capital or financial resource to help catalyst the creation of productive enterprises, But

There are a few studies analyzing the empirical relationship between FDI and economic growth in Ethiopia. Therefore, I believe that this thesis will provide more light on the benefits and costs of the existing FDI, Help in filling knowledge gap in such area, Be important in elaborating the significance of FDI to economic growth in Ethiopia, Help experts to re-evaluate foreign relations as well as take measures that will help gain the positive benefits of FDI, Important because FDI stimulates economic growth and spurs economic development as a whole, Be a vital tool for policy makers in developing countries as th evidence, Provide guidelines on how to improve their economic policies so as to attract more FDI in their countries, Help as a good tool for academicians as well as investors to evaluate the importance of FDI on economic growth in Ethiopia, Assist as a reference tool for researchers seeking to find out the effect of FDI on economic growth, Come up with mechanisms to enhance the positive impacts of FDI on Economic Growth through such paths as change of policy, Search to provide better understanding characteristics and trends of FDI activates in Ethiopia.

Generally, the expected outcome from this study could also be useful in improving policy design, institutional setup, implementation, monitoring and evaluation of FDI. As well as, it can suggest further study in the area more precisely. So, the result of this study on the impact of FDI on growth and development is important not only to researchers interested in economic development but also to people responsible for formulating development policy. Hence, the findings and empirical results of this study are provide empirical evidence and try to contribute to the policy debate on the linkage FDI for policy.

1.7 Scope of the study

This paper are limited to the quantitative analysis of the relationship between the selected macroeconomic variables, namely economic growth measured in real gross domestic product (as dependent variable) , foreign direct investment, export, capital formation, (as independent variable). So this study is rotate on the orbits of the impact of FDI on Ethiopian economic growth based on time-series data over the period 1980/81-2014/15.

1.8 Limitation of the study

The limitations of the study are concerned with the problems of time constraints, money constraints and lack of some requirements (unavailable or insufficient data especially foreign direct investment for in-depth research investigation about the study. So the study was consider only some key factors that determine Economic growth including FDI inflows and also considers only some macroeconomic determinants of economic growth.

1.9 Organization of the research paper

This paper is organized into five chapters. Chapter one is the introductory parts of the paper; it includes the background of the study, statement of the problem , hypothesis of the study, objectives of the study, research question, significance of the study, scope of the study, limitation of the study and organization of the research paper. Chapter two is review of related literature and it has two parts: theoretical literature and empirical literature. Chapter three is research methodology and data description. Chapter four is empirical analysis and discussion of findings. Chapter five is conclusion of major summary findings, and recommendations.

CHAPTER TWO

2 LITERATURE REVIEW

2.1 Introduction

This section presents the analysis of theoretical and empirical literature on the effect of foreign direct investment on economic growth. So there is a large body of theoretical and empirical literature on the impact of FDI on economic growth. But empirical evidence on the relationship between FDI and economic growth is still questionable or unclear. However, FDI is assumed to have a number of positive effects on the economy of the host country, (such as transferring resource, increasing employment opportunities, improving the balance of payment, transferring technology, productivity gains, introduction of new processes, managerial skills and know-how, employee training, building capital, human formation, increase competition) and in general it is a significant factor in modernizing then host country's economy and encouraging its growth.

2.2 Concepts and definitions of FDI

In history FDI is believed to begin in the 19th centuries. But now today there is no straightforward and clear-cut definition of FDI, as different organizations use slightly different definitions. FDI is defined as an investment involving a long-term relationship and control of a resident entity in one economy. FDI implies that the investor applies a significant degree of influence and control over the management of the enterprise resident in the other economy. International Monetary Fund (IMF) defines FDI as “investment that is made to acquire a permanent interest in an enterprise operating in an economy other than that of the investor, the investor's purpose being to have an effective voice in the management of the enterprise” (IMF, 1977). Similarly, UNCTAD (1999) defines FDI as “an investment involving a long term relationship and reflecting a permanent interest and control of a resident entity in one economy (foreign direct investor or parent enterprise) in an enterprise resident in an economy other than that of foreign direct investor”.

FDI represents the primary means of transfer of private capital (physical or financial), technology, personnel and access to brand names and marketing advantage (Makola, 2003). He defines FDI as a form of international economic integration that brings gains to both parties according to the principle of comparative advantage. FDI inflows are combined by main three

capital components. First is equity capital, which is the foreign direct investor's purchase of shares of an enterprise in a country other than its own. Second, reinvested earning which is the earning of the direct investor's share. Third, is an intra-company loan or an intra-company debt transaction which involves borrowing and lending of funds between direct investors and association enterprises (Jones, J and Wren, C 2006).

Similarly, Dunning (1993), also recognized FDI by the following three ways; First, market seeking FDI that refers to the purpose of helping local and regional markets, host countries characteristics that can attract this kind of FDI are the sizes of per capital income, GDP growth and the growth potential of the market. Second, resource seeking FDI refers to FDI for acquiring resource that is not available in the home country. Like natural resource, raw material, and availability of skilled and unskilled labor. Third also, Efficiency seeking FDI, this type of FDI happens when a firm can gain from the common governance of the geographically dispersed actions, especially in the existence of economic scale and scope, and diversification of risks.

2.3 Theoretical Review

2.3.1 Solow Growth Theory

The role of foreign direct investment (FDI) in stimulating economic growth is one of the host issues in the development literature. This theory was developed independently by Solow and Swan in 1956 through the Solow-Swan model. In the standard slow type growth model, FDI enables host countries to achieve investment that exceeds their own domestic saving and enhances capital formation. The Solow model emphasizes capital accumulation and exogenous rates of change in population and technological progress. This model predicts that all market-based economies will eventually reach the same constant growth rate if they have the same rate of technological progress and population growth. Moreover, the model assumes that the long-run rate of growth is out of the reach of policymakers (Solow, 1956). The key idea of this framework is that growth is caused by capital accumulation and autonomous technological change. Solow views the world as one in which output, Y , is generated by the population function $Y = F(K, L)$, where K is the capital stock and L is the labor force. He postulated that the production function displays constant return to scale, so that doubling all inputs would double output. However, holding one input constant- say, labor and doubling capital will yield less than double the amount of output. Referred to as the law of diminishing marginal returns, this is one of the distinguishing

elements of the Solow model. In the Solow growth model, where technological progress is exogenous, income will rise with the level of physical or human capital (accumulated human knowledge

2.3.2 Neoclassical growth theory

The neoclassical theory was developed by neoclassical economists, initially introduced by Veblen in 1900. The theory was further developed by various neoclassical theorists who consider production to be directly related to reproduction. Neoclassical theory stipulates that international capital flows with differentiated rates of return across countries lead to capital arbitrage, where capital seeks the rate of return.

The neoclassical growth theory in contrast, which dates back to Solow (1956) and Rostow (1956), assign an important role to FDI as a growth-enhancing factor to developing countries. In the growth model by Rostow (1956), FDI is realized as a way of meeting the capital and technological transfers required for economic transformation. Solow (1956) emphasizes on the increased FDI and progress in technology as important variables in output growth, hence development. Moreover, according to this theory, economic growth comes from two sources, factor accumulation, and total factor productivity growth. As a result, FDI plays a double function by contributing to capital accumulation and by increasing total factor productivity (Lucas, 1988). Likewise, in the neoclassical growth models FDI promotes economic growth by increasing the volume of investment and/or efficiency.

2.3.3 Endogenous Growth Theory

On the other hand, endogenous growth model (e.g. Romer (1993), Lucas (1988), and Barro and Sala-i-Martin (1997) that highlight the importance of improvement in technology, efficiency, and productivity suggest that FDI can positively influence the growth rate in so far as it generates increasing returns in production through externalities and production spillovers. On further theoretical arguments why developing countries may not gain from FDI; Krugman (1998), argues that the transfer of control from domestic to foreign firms may not always be beneficial to the host countries because of the adverse selection problem.

FDI undertaken within a crisis situation under “fire sale” may transfer ownership of firms from domestic to foreign firms that are less efficient. This concern is particularly important to the developing countries including the sub Saharan African countries, where, as part of privatization,

state owned enterprises, are sold to foreign firms simply because foreign firms have more available funds than domestic ones. As pointed out by Salz (1992) and Agosin (2005) FDI may also “crowd out” domestic firms through unfair competition. There is also a concern that the reserve nature of many foreign owned firms and their minimal linkage to the rest of the economy could reduce the potential spillover contribution to the national economy. Moreover, the potential subsequent outflow of foreign firms' lower earnings to their parent companies could also cause deterioration in the balance of payments. It is also argued that foreign corporations tend to produce unsuitable goods that are handmade to satisfy the wealthy portion of the host country's consumers, thereby increasing inequality and engaging in transfer pricing.

2.3.4 Economic Geography Theory

Yarbrough & Yarbrough (2002) discuss recent theoretical models of economic geography that attempt to explain the spatial location of FDI. They assume that the decision of a Trans National Corporation (TNC) on which area to locate investment depends on a set of characteristics of the host area affecting firm's revenue or costs such as factor endowments, market size, per capital income, skilled labor and availability of public infrastructure, among others. Aiello et al. (2009) argue that other things being equal, a change in infrastructure expenditure influences the cost faced by the firm in adjusting its current capital stock to the target level. They argue that this is a reasonable assumption, given that the adjustment costs depend not only on the firm's internal characteristics, but also on external factors, such as the provision of public infrastructure. In the current global structure, geographical proximity and cultural & linguistic attractions are becoming one important determinant of FDI (Jinayu, 1997)

2.3.5 Industrial Organization Theory

Hymer was one of the innovators who established a systematic framework in the study of FDI. He was supported by Kindle Berger, (1969), (Caves, (1971), and Dunning (1979). among others (Hymer, 1976). Hymer's theory posits that firms operating abroad have to compete with domestic firms that are in an advantageous position in terms of culture, language, legal system and consumer's preference. Furthermore, foreign firms are also exposed to foreign exchange risk. These disadvantages must be offset by some form of market power in order to make international investment profitable. The sources of market power– the firm-specific advantage in Hymer terms or monopolistic advantage in Kindle Berger's terms are in the form of patent-

protected superior technology, brand names, marketing and management skills, economies of scale and cheaper sources of finance. According to Hymer, technological superiority is the most important advantage as it facilitates the introduction of new products with new features. Moreover the possession of knowledge helps in developing other skills such as marketing and improved production process. A significant feature of this theory is that it articulates the point that the advantages are transmitted effectively from one unit of a firm to another unit of that firm, irrespective of the fact that they are either located in one country or in more than one country (Caves, 1971). The Hymer-Kindleberger (HK) theory addressed the question of why foreign multinational company is able to compete with indigenous /original firms in the host economy, given the various advantages of indigenous firms. The indigenous firm has knowledge of domestic market, consumer tastes, the legal and institutional framework of local business and customs. In contrary, foreign firms face costs of operating business such as the scarcity of the host country's information, difficulty in communication, fluctuation in exchange rates and sometimes discrimination from political instability when they enter a new business environment (Jones, J and wren, C 2006).

The theory states that the foreign firms must possess some rewarding advantages which allow them to compete on equal terms with domestic firms. Foreign firms have advantages specific to their ownership in order to compete with domestic firms. These potential advantages include innovative, ownership of a brand name, the possession of special marketing skills, and access to patented or generally unavailable technology, favored access to sources of finance, team-specific managerial skills, plant economies of scale and economies of vertical integration. Thus, international production/ FDI/ arise due to the fact that it is difficult to sell these advantages. They cannot be sold because they are inherent in firm managerial experiences and organizational capabilities (Moran, 1978). However, the theory could not explain certain aspect of FDI flows. While the existence of some firm-specific advantages explains why a foreign firm can compete successfully in the domestic market, such advantages do not explain why such competition must take the form of FDI. It over-emphasizes the role of structural market failure and ignores the transaction-cost side of market failure.

2.3.6 Internalization Theory

The Internalization theory was founded conceptualized by (Buckley and Casson, 1976) which explains how multinational companies developed and became so strong and how they manage their goals in Foreign direct investment, this theory asserts that MNCs are consolidating their inside accomplishments so as to develop specific advantages, which then to be exploited. To increase profitability, some transactions should be carried out within a firm rather than between firms and this is one of the reasons why multinational companies exist. This theory may answer the question why production is carried out by the same firm in different locations. Mostly, technologies or knowhow can be sold and licensed. However, sometimes, there are technologies that are embodied in the mind of a group of individuals and not possible to write or sale to other parties. This difficulty of marketing and pricing know how forces multinational companies to open a subsidiary in a foreign country instead of selling the technology. In addition, a number of problems may arise if an output of a firm is an input to other firm in other country. For instance, if each has a monopoly position, they may get into a conflict as the buyer of the input tries to hold the price down while the firm that produces input tries to raise it. Nevertheless, these problems can be avoided by integrating various activities within a firm rather than subcontracting the activities (Krugman and Obstfeld, 2003). (Casson, 1976), developed the theory by focusing on two kinds of integration which are vertical and horizontal integration. In this theory, multinational companies work globally having foreign operations and transactions with other firms located abroad by means of a governance structure with contracting.

It occurs in two different cases. First, when there isn't any market that can provide the basic products the multinational companies need and the second reason is that the external or foreign market which can supply such products isn't effective and fails to supply the goods needed by such multinational companies. Global competitive advantages can be developed by means of internalization by forming international economies of scale and scope.

2.3.7 Product life Cycle Theory

The Product Life Cycle Theory was developed by Vernon in 1966 based on the experience of the U.S market. This theory was used to explain certain types of FDI made by U.S companies in Western Europe after World War II (WW2). This theory explains how trade patterns change over time. According to Vernon, a product has a life cycle that has four main stages innovation,

growth, maturity and decline. In the first stage, the U.S companies create new innovative products for local consumption and export the surplus for the use of foreign markets. This stage characterized U.S's advantage of technology on international competitors as they were able to manufacture the needed goods. The second stage was characterized by the MNC shifting the production to the developing country. This would help the MNC cut on export costs, gain more profits and also import some of the goods back to the home country. The third stage saw the developing country's competitor export the goods to the MNC's home country. This marked clear competition between the host country and the MNC home country, thus labeled the maturity stage because the developing country's competitors have stabilized enough to export to the MNC's country. The last stage was characterized by the developing country's markets remaining viable target markets for other MNCs due to the stabilized economy. The MNC home country market is seen to diminish. This theory explains both trade and FDI by outlining the various phases of a MNC's Foreign Direct Investment and the changes over time. New products are introduced to meet the local needs. These new products are first exported to similar countries with similar needs, preferences and incomes. Increase in sale of the new product attracts competitors and an increase of demand through exports to advanced countries occurs. Further innovation in production, cost reduction and market process takes place and manufacturing is shifted to foreign countries. Worldwide production through exports declines as a result of large scale production and manufacturing is shifted to developing countries, making technology standard. Market for the product concentrates in the less developed countries and demand shifts to the developed countries, making the original innovator the importer.

2.3.8 Caves Theory

Caves developed a theory that distinguishes types of FDI in 1971. According to his theory, there are two types of firms that engage in FDI: horizontal and vertical FDI. Horizontal FDI takes place when a firm enters into its own product market within a foreign country, whereas vertical FDI occurs when a firm enters into the product market at a different stage of production (Dunning, 1993). Horizontal FDI firms will undertake if it either possesses a unique asset which others do not have or because of the adverse effects of tariffs on its exports. Both reasons are likely to result in FDI occurring in market structures characterized by oligopoly and product differentiation abroad. First, the asset must be a public good within the firm so that once provided the sunk cost has occurred and the firm's advantage can be used in other national

markets, for instance, the possession of superior knowledge. This allows the firm to offset any informational disadvantages that compared with foreign local firms that will have accumulated knowledge on the social, economic and cultural factors in that market. Second, profits made in the host country must depend upon production in that country, as this ensures that the firm has to locate abroad if it is going to be successful in production. The theory states that both characteristics will be found in a market with product differentiation so that the firm can move into these markets at minimum cost. In general, horizontal FDI is a feature of oligopolistic markets where products are differentiated (Caves, 2007). Vertical FDI occurs when firms seek to avoid strategic uncertainty and put up entry barriers to prevent foreign firms from entering the market. It is argued by Caves that vertical FDI is more likely if profits in the foreign market are dependent on long-term prices and large investments size. These together ensure market structure that is characterized by a few suppliers. But, FDI is unlikely to occur when there is no technological complementarity between stages of production and competitive market.

2.3.9 Location Theory

The theory was first developed by Heinrich (1826). He notes that because transportation costs and, of course, economic rents vary across goods, different land uses and use intensities will result with increased distance from the market place. The Location theory is generally concerned with location specific advantages of production. So theory in itself is concerned with the geographic location of an economic activity. It explains FDI in the context of the location specific factor differentials. Location theory explains about supply (cost factors) and demand (market factor) variables that affect the distribution processes of firms. i.e. It comprises “supply oriented location theory” and “demand oriented location theory”. The comparative advantage, the availability of raw materials, and transportation cost are main determinants in this theory. FDI exists because of immobility of these factors of production (Claudia, Kleinert, Lipponer, Toubal, Midelfart, 2005 and Markusen, 1995). The theory’s explanation for FDI can be discussed more by the following factors. First, the availability and cost of inputs can explain the existence of FDI. A firm considers the source of input and cost of production in order to choose the location. Thus, a firm investing abroad may be attracted by the availability of some inputs in another country, which are scarce at home, or by the lower cost of inputs abroad such as cheap labor cost. The lower labor costs can be the main reasons for FDI in developing countries (Jones, J and wren, C (2006).

Second, marketing factors are the main driving force that stimulates foreign firms to invest abroad. A firm can get many advantages by locating a production plant near the market. Firms can conduct business smoothly because of locating the firm abroad and hence can better exploit the local market. Furthermore, the production through the setting up of subsidiaries in a host country may be more accepted by the local people than direct exporting. Finally, FDI is stimulated by the existence of trade barriers. Subsidiaries of foreign firms are often set up in another country that is not yet subject to trade restrictions. Then, the products are exported to those markets that have imposed restrictions on the exports of the investing country.

2.3.10 An Eclectic Theory

Electric Paradigm theory was developed by Dunning (1988). This theory integrates/ constitutes from three different theories of FDI: such as the industrial organization theory, the internalization theory and the location theory (Dunning, 2000). According to this theory, there are *three* conditions that must be satisfied if firms to engage in FDI. *First*, the firm must have some ownership advantages with respect to other firms. These advantages usually arise from the possession of firm-specific intangible assets. *Second*, it must be more beneficial for the firms to use these advantages rather than to sell or lease them to other independent firms. *Finally*, it must be more profitable to use these advantages in combination with at least some factor inputs located abroad. Thus, if FDI to take place, the firms must have ownership and internalization advantages, and a foreign country must have location advantages over the firms home country. Dunning further divides these advantages into three groups. They are: (1) Ownership advantages, (2) Location advantages, and (3) Internalization advantages. These three advantages create the famous OLI model. These advantages are: benefits the firm can achieve from its size, monopoly power and better resource capacity and usages; and benefits derived from the enterprise's ability of operation and management such as know-how, organizational and marketing systems.

Location advantages are key determinants of host countries during the MNC's screening process when looking for a suitable location to invest in. The specific advantages to the country here are economic benefits comprising of both quantitative and qualitative factors of production, transport costs, existence of raw materials, technological advancement and the market itself, political benefits such as market structure, government legislation and policies, legal, and special taxes that affect FDI inflows and social advantages such as cultural diversity and behavioral changes

such as attitudes towards foreigners (Dunning, 1979). So there are two types of location advantages. The *first* type gained from attractions of special location advantages provided by the host country, such as cheaper labor forces market for the product and the government's better policies. The *second* one is generated from the limitations of the home. The investors are forced to decide on direct investment abroad because they suffer from disadvantages in their own countries such as a small market for their products, lack of raw materials and higher production costs. In short, Location advantage (L) of firms is determined by natural resource endowments; market size; assets (skilled labor, technology & infrastructure); and the sub region's regulatory and policy position.

Internalization advantages refer to the benefits that the firms can secure by using its ownership advantages internally between the parent company and its subsidiaries. According to this theory, the importance and role played by O, L and I are different which determines the firms' choice of international trade or direct production abroad. So internalization advantage shows flexibility level and capacity of the firm in producing and marketing its own subsidiaries (Dunning, 1979). In short, Internalization advantage (I) assesses how firms create and use their essential competencies.

Ownership advantage is a firm specific advantage that gives power to firms over their competitors. So the use of these benefits in a foreign market results in higher marginal profitability or lower marginal costs than other competitors in the foreign market (Dunning, 1988). This includes advantage in technology and information, in management techniques (entrepreneurial skills and organizational systems), easy access to finance, economies of scale and capacity to coordinate activities, natural endowments, marketing, manpower, and capital. Of these three advantages, ownership advantages are essential (Dunning, 1979). i.e. Ownership advantage (O) asserts how foreign firms enjoy competitive advantage relative to domestic firms. Therefore there is no enterprise that can engage in FDI without any ownership advantages. However, if the firm has only ownership advantages without the other two advantages, it will benefit from licensing instead from FDI. If the firm has advantages of ownership and internalization but not location advantages, it will prefer to sell its products by exporting. In conclusion, FDI occurs only when a firm has all these three types of advantages. In other words, all these factors are energetic for foreign direct investment as they show the level and pattern of foreign direct investment.

Generally, one of the features of the eclectic theory is that it makes it to clear the difference between structural and multinational market failure. The eclectic theory offers a better and clear understanding of foreign direct investment when it is compared to the other theories as it defines all the three variables of (OLI) all together creating an explanation from which everyone can easily understand how the variables work and form foreign direct investment

2.4 Views on the Impact of FDI

There are two views on the impact of FDI on host economy: the benevolent model that argues for FDI and the malign model that argue against. These two alternative conceptualizations guide the understanding of the impact of FDI and its potential contribution to the economic development for the host economy. The benevolent model assumes that FDI is more useful to the economies which are fixed in the vicious circle of under development. If the potential host economy is hindered in poverty loaded equilibrium with vicious circle of poverty, FDI can break this by complementing local saving and supplying more effective management, marketing and technology to improve productivity. The gain in national income depends on the size of the capital flows and the elasticity of the demand for capital. Furthermore, technological and managerial inputs, transfers and spillovers to local firms may reason the nation's production function to shift upward. Therefore, under competitive condition (which is presence of foreign firms and FDI may enhance); FDI should raise efficiency, expand output and lead to higher economic growth in the host economy. The emphasis on the new resources that the foreign investors bring to remove the bottlenecks that discourages the development process is a common theme among international business groups and multilateral agencies that need greater acceptance of FDI in the developing countries (Moran, 1993). Whereas as in malign model also there is a long history of criticism of Multinational Corporation, much of it centers of the possibility that foreign investors will prevent the way of laws that constrain socially undesirable practices, such as pollution regulation or healthy safety and minimum wage requirements or ignore laws already enacted. In the previous stage, a few studies showed that foreign capital had a negative impact on the growth of the developing economies. The foreign firms made negative impact on the host economy because they operated in industries where there were substantial/extensive barriers to entry and increasing market concentration (Moran, 1993).

In this case, the foreign firms are creating to lower the domestic savings and investment by extracting rent. According to this model, foreign firms have a potential to drive out the local producers from business and substitute imported inputs. In such a situation, the foreign firms might not link the gap between domestic investment and foreign exchange. In addition, the repatriation of profit by these foreign firms drains out the capital from the host country.

2.5 Role of FDI in Growth

FDI can be seen a means of transportation for industrial development and technological progress. It increases productivity and technological progress in a host country, FDI might therefore have positive impacts on economic growth. In developing countries like Ethiopia, a combination of advanced management skills and new technologies is likely to increase the efficiency of economy. Thus, FDI may be the main channel through which advanced technology is transferred to developing countries and hence affect economic growth positively (Neuhaus, 2005). Contrary to the above argument for positive effect of FDI on economic growth, there is also debate on the possible adverse effects of FDI on economic growth. The debate has focused on the economic condition of the recipient economy. Human capital and the financial market development in the host country may influence the FDI effects. Borensztein, et al (1998) describes the importance of human capital in the host country. These authors suggest that the FDI effects on economic growth depend on the level of human capital available. Their empirical results indicate that the higher productivity of FDI holds only when the host country has a minimum threshold stock of human capital. If they are correct, FDI can only be expected to contribute to economic growth when the host economy has a sufficient capability to absorb advanced technologies. According to Alfaro, Chanda, Kalemli, and Sayek (2004) local financial market development matters for contribution of FDI to host country's economic growth.

2.6 Empirical Evidence on Impact of FDI

At macro level empirical findings on the effect of FDI inflow on economic growth are mixed. However, the positive contribution of FDI to growth is argued for by many researchers. Therefore to summarize, there have been various empirical evidences that investigated the impact of FDI on economic growth. For instance Bengoa and Sanchez-Robes (2003) found that FDI has a significant positive effect on economic growth of developing countries. But the size of

its impact may vary from country to country depending on human capital, domestic investment, infrastructure, macroeconomic stability, investment policy and liberalized capital market.

Similarly, De Mello (1999) and Borensztein et.al, (1998) found that there is a relationship between FDI and economic growth, though this tend to be so because of the host country characteristics such as human capital. Thus, the favorable growth enhance impact of FDI is dependent on the conditions and characteristics of a host country enabling environment. Investment recipient countries with better endowment of human capital and strong institutional capacity are supposed to benefit more from FDI induced technology transfer and thereby productivity gain. Studies by Blomstrom, Lipsey and Zejan (1994) found that FDI promotes growth only in higher income developing countries. The study was a cross country analysis of 78 developing countries and they found no positive effect for lower income developing countries. Balasubramanyam et.al (1996) investigated how foreign direct investment impacted economic growth in developing countries using cross-sectional data and the Ordinary Least Square (OLS) regression method. They found that FDI has a positive impact on economic growth only in countries that have export promoting strategy.

The sector impact FDI on economic growth has not been studied broadly; the earliest research to consider this matter was Alfaro (2003). The study was based on 47 countries in the primary, secondary and service sectors for the period from 1981-1999 in cross country regression. In his finding, positive growth effect of FDI was found on manufacturing sector, negative in the primary sector and the service sector was found to be ambiguous. Nunnenkamp et al. (2006) also found that the growth impact of FDI varies across sectors. The study was based on panel co-integration framework for 15 industrial in the primary, secondary and service sector in India. They found no causal relationship in the primary sector, temporary growth effect of FDI in the service, and FDI stock and growth were mutually supporting in the manufacturing sector. Similarly, a study conducted by IMF(2011) on Eastern Central and South Eastern Europe countries indicate that the impact of FDI on trade depends on whether the sector are tradable and non-tradable. The paper defined manufacturing, agriculture, mining, retail, hotels, and restaurants as tradable sectors and electricity, transport, communication, real estate and financial intermediation as non-tradable sectors. They study was conducted by applying both a cross sectional and time series econometrics method. According to this research finding, FDI in tradable sector is positively associated with higher export implying that there is a positive

correlation between stock of FDI going to these sectors and export performance of countries. On the other hand, their empirical finding shows that FDI in non-tradable sector is positively associated with import.

A few scholars have also emphasized on the way in which the growth effects of FDI depends on the financial market conditions of the recipient country. Alfaro et al. (2004), emphasize that growth effect of FDI depends on sound financial markets of the host country. He used cross-country data for the period of 1975-1995 and found that FDI alone plays a vague role in promoting economic growth, however, when several financial development measures are included positive effects are found. Olofsdotter (1998) also argues that the beneficial effect of FDI is stronger in those countries with higher level of institutional capacity. Similarly, Chang (2009) applied panel co-integration and panel error correction model for 37 countries using annual data from 1970-2002, found positive relationship between FDI and growth when financial development measurement are included. When a country has a solid financial system as its foundation, it follows that it is in a better position to more effectively earn the benefits from FDI inflows.

Likewise, Li and Liu (2005) find that FDI has positive impact on economic growth of both developed and developing countries. i.e. in both case FDI significantly and positively affect economic growth; however, the interaction of FDI with technology gap of the countries behave differently implying the difference of technology and hence absorptive ability of nations. In sum, they concluded that there is a strong complementary connection between FDI and economic growth both in developing and developed countries. The empirical analysis of Seetanah and Khadaroo for 39 Sub-Saharan African countries over 1980-2000 exposed that FDI is an important element in explaining economic performance of Sub-Saharan African countries.

Haile & Assefa in (2006) tried to examine the nature and factors that attracting FDI in Ethiopia as a case study of their empirical research concentrating on theoretical relation between economic growth and foreign direct investment in a edition to policy regimes, results of this study concluded implicated that the growth rate of real gross domestic products besides free trade with exports promotions have positive effects on attracting foreign capitals rather than non-stable macro level regard with lack of infrastructure capabilities seems to have negative impacts on attracting foreign direct investment in Ethiopia.

Tang and Selvanathan (2008) investigated the causal link between FDI, domestic investment and economic growth in China for the period 1988-2003. The empirical result shows that there is single-directional causality from FDI to domestic investment and economic growth. Similarly, an empirical work of Magnus and Fosu (2008) for Ghanaian economy indicated that the null hypothesis that FDI does not Granger cause GDP was not rejected, that is there is a one way causal relationship between FDI and GDP growth in which the direction of causality is from FDI to GDP growth. On the other hand, some research work claims that the contribution of FDI to growth is not positive. For instance, Carkovic and Liven (2002) assert that FDI does not have a healthy independent influence on growth based on their studies conducted for 75 countries.

Similarly, the research work done by Mwlima (2003) does not support the importance of FDI in economic growth. He concluded that there is no real evidence that FDI brings development. Similarly, for Sri Lanka, Athukorala (2003) tested the FDI-led growth hypothesis using time series data from 1959 to 2002. The result did not support the link between FDI and economic growth. In the same way, Nunnenkamp and Spatz (2003) claim that conclusive evidence to support the view that developing countries should draw on FDI to promote economic development hard to come up. They contend the result on the growth impact of FDI is ambiguous because of highly aggregated FDI data. Asiedu (2002) conducted a study on 32 sub-Saharan African countries and 39 non sub-Saharan African countries over a period of 10 years (1988-1997). She argues that FDI inflows into sub-Saharan African countries are for market seeking. Asiedu (2004) argues that natural resource and market size are the chief determinants of FDI. Asiedu (2002) finding indicates that FDI in Africa is not solely determined by availability of natural resource and that can play an important role in directing FDI through trade reform. In addition to the above, she argues FDI policy instruments used to attract foreign investors. But as explained in Asiedu (2004) the investment incentive by itself cannot be enough. The host country should increase other determinants like infrastructure and market size, macroeconomic and political stability, efficient institution and improvement in infrastructure.

Likewise, Meskerm Daniel (2014), Selamawit Berhie (2015), Birhe Esthete and Thomas Gebrie (2012), Mulat Chanie (2012) and Dejene Gizew (2014) findings also indicate that mostly FDI in Ethiopia has positive and significant effect on economic growth. But Meskerm Daniel findings show the effect comes after two year lags.

Generally, FDI may have deep effects; those there are of various kinds such as growth, export, technology, know-how transfer etc. however, these effects are found to vary across countries and depend on several circumstances/factors such as institutional development, human capital development, government policies, sector, etc. therefore government took a number of measurements to improve its investment climate and attractiveness to potential investors. So this paper is attempted to examine the effects of foreign direct investment on economic development in Ethiopia by measured through real GDP growth, and spillovers effects.

2.7 Conceptual Frame Work

The conceptual frame works were designed from theoretical basis, practical observations and empirical evidences. Most of the theoretical models imply that FDI is beneficial for the host country's economic growth and also there is a widespread belief among policymakers that FDI generates positive productivity for host countries. So among those different theories, Solow's growth model has clearly stated the importance FDI in economic growth process. Because the key idea of this theory is that economic growth is caused by capital accumulation and technological change. Meaning that, the role of technological progress and capital accumulation has been clearly stated as an important driver of economic growth in the model. Due to these facts, Solow's growth model is my theoretical framework/base for this thesis. But different empirical evidence fails to confirm this belief. Especially, In the case of developing countries many empirical literatures finds on the effect of FDI on host countries economic growth is still a debatable one. Some empirical studies indicate positive link between FDI and economic growth. Because it is an alternative source of capital, technology and skill gain, increase production and trade networks; enhance socioeconomic development. (Haile and Assefa, 2006; Meskerm Dan (2014), Selamawit Berhie (2015), Birhe Esthete and Thomas Gebrie (2012), Mulat Chanie (2012), Dejene Gizew (2014) Demollo, 1997; Ayanwal,2002; Agrawal,2005; Sala and Trivin,2014; Sukar and Hassan,2011; Kabundi andloots,2012; Zakari et.al,2012; Lenka and sharma,2015; Njoupouognigni and Ndambendia,2010; and Li and Liu, 2015). Contrary to this, some other scholars (Carkovic and liven, 2007; Alege & Ogundipe, 2013; Mwlima, 2003; Athukorala, 2003) argue that FDI retards economic growth through crowding out of domestic infant industries , exploiting local resources, repatriating profits to their home countries, opening door for corruption by some public officials. But, my finding were confirm with some empirical studies about the positive effect of FDI on economic growth in Ethiopia. Some empirical studies

identify FDI has positive impact on economic growth depends on various aspect of the host countries. Like economic sector, effect human capital, export promoting countries, higher income developing countries, tradable and non-tradable sectors, natural resource etc.

Table 1:- Summary of Main Findings of the Empirical Literature Reviewed

Author	Types of data	Countries and time period	Result
Alfro(2003)	Cross section and panel data	47 developing countries 1981-1999	Sector effects of FDI and negative effect on primary sector, positive in manufacturing sector and ambiguous effect on service sector
Bengoa and Sanchez-Robels (2003)	Panel data and time series	18 Latin American countries 1970-1995	FDI has positive effect on growth but it depends on human capital, economic stability and liberalized capital market. .
Borensztein et al. (1998)	Cross section	69 developing countries 1970-1989	FDI has positive effect but its magnitude depends on human capital in host country.
Balasubramanyam et.al. (1996)	cross section	46 developing countries 1970-1985	FDI has positive effect only for export promoting countries.
Blomstrom et al. (1994)	Cross section and panel data	78 developing countries 1960-198	FDI has positive effect on growth only in higher income developing countries.
IMF (2011)	Cross section and time series	Eastern Central and South Eastern Europe countries	The study found positive correlation between export performance and FDI stock in tradable sectors
Asiedu(2002)	Cross section and time series	32 Sub-Saharan and 39 Non-Sub Saharan African countries	FDI has positive effect on growth based on natural resource and market seeking

But, this paper was investigated basically the constructive effects of FDI on economic growth in Ethiopia based on the whole economic activates rather than disaggregated and explain whether FDI has a positive and negative impact on economic growth in Ethiopia in overall from the period of 1980/81-2014/15.

CHAPTER THREE

3. METHODOLOGY

There are many types of multivariate time series models to choose from. First of all, there is a decision about linear and non-linear models, and then the specific type of model within these two categories. Many non-linear models have been specially designed and tailored for the problem area they are applied to, especially within the financial domain, the choice of which model to use can be very difficult. The data set under consideration within this thesis will be modeled by one of the multivariate linear time series models, the main linear models are the Vector Autoregressive (VAR) process.

3.1 Econometric Model

The basis of the research model is the augmented Cobb-Douglas production function with FDI incorporated as one of the factor inputs. Theoretical model of first approach is formulated as follows:

$$GDP = f(\text{foreign direct investment}) \text{ or } GDP = f(FDI)$$

The model hypothesizes that GDP is a function of FDI. Although GDP might also be affected by some other factors such as Fixed Capital Formation (FCF) and Export (X), they are included in this model additionally. But we would like to examine primarily the causal relationship between economic growth (GDP) and foreign direct investment (FDI). Therefore, other variables are excluded in the economic model of this study.

The functional relationship between the variables and proxies can be expressed as:-

$$GDP = f(FDI, FCF, X)$$

3.2 VAR Time Series Analysis

The vector Autoregressive (VAR) model, proposed by Smith (1980), is one of the most successful, flexible, and easy to use models for analysis of multivariate time series. It is applied to grasp the mutual influence among multiple time series. VAR models extended the Univariate Autoregressive (AR) model to dynamic Multivariate time series by allowing for more than one involving variables. All variables in a VAR model are treated symmetrically in a structure sense;

each variable has an equation explaining its evolution based on its own lags and lags of the variables.

Let $Y_t = (y_{1t}, y_{2t}, \dots, y_{nt})'$ denote a $(n \times 1)$ vector of time series variables. A VAR model with p lags can then be expressed as follows;

$$Y_t = c + \pi_1 Y_{t-1} + \pi_2 Y_{t-2} + \dots + \pi_p Y_{t-p} + \varepsilon_t, \quad t = 1, 2, \dots, T$$

Where the i -period back observation Y_{t-1} is called the i -lag of Y , π_i is $(n \times n)$ coefficient matrix, c is a $(n \times 1)$ vector of constants (intercepts) and ε_t is an $(n \times 1)$ unobservable zero mean white noise vector process satisfying the following properties.

- The error term is normally distributed with mean zero [$E(\varepsilon_t) = 0$]
- The error term has to be constant variance (Homoscedasticity) or time invariant. That is $E(\varepsilon_t \varepsilon_t') = \sigma^2$
- The error has to be independent white noise process with time invariant $E(\varepsilon_t \varepsilon_{t-k}) = 0$ for any non-zero k , meaning that there is no correlation among the errors across time, in particular, no serial correlation in individual error terms.

3.2.1 The choice of the variables

We have to determine a list of variables which can be assumed to affect each other intertemporally. When we choose the variables, it is necessary to take three aspects into consideration;

- The chosen variables should be related to the research problem.
- The choice of the variables should be in accordance with the theoretical hypothesis.
- Data used for fitting the model must be available and of good quality.

In this study, the VAR model set up used as GDP and FDI as inter-affect variables to generate the VAR model.

3.2.2 Testable hypotheses

Based on the above framework, I test the hypothesis that FDI has an effect on economic growth in Ethiopia. The null hypothesis is that FDI does not have an effect on growth in Ethiopia, while the alternative hypothesis is that FDI Positive effect on growth in Ethiopia.

3.2.3 Testing the stationary of time series

This is the first step in any time series econometric analysis. Much of the theory for both the linear univariate and multivariate time series analysis has been concentrated on a particular family of times series referred to as stationary time series. In short, a time series is stationary if its first and second moments (mean and variance) are time invariant. One interpretation of the Wald decomposition theorem [Lutkepohl1993] is that a VAR process can be used to represent stationary multivariate time series. With multivariate time series, there is another family called stable multivariate time series; Smith (1980) suggests that non-stationary time series are still feasible in VAR modeling. But in practice, using the non-stationary time series in VAR modeling is problematic with regards to statistical inference since the standard statistical tests used for inference are based on the condition that all of the series used must be stationary. That means, stationary is important for time series analysis for some statistical evidence. In order to do that, ADF and Phillips–Peron unit root tests are used. The hypothesis in unit root test is as following:

H_0 : Time series is non stationary or there is a unit root

H_1 : Time series is stationary or there is no unit root

If the test statistics of a variable is less than the critical in absolute terms, then the null hypothesis cannot be rejected. Therefore, the first difference of a variable should be tested. If test statistics of a variable is more than critical value in absolute terms, then the null hypothesis can be rejected, which indicates the stationary condition of a variable.

3.2.3.1 Augmented Dickey-Fuller

In conducted the DF test, it was assumed that the error term ε_t was uncorrelated. But in case ε_t is correlated, Dickey and Fuller have developed a test known as the Augmented Dickey-Fuller (ADF) test. This ADF test is a modification of the DF test and involves Augmenting the Dickey-Fuller equation by lagged values of the dependent variable. This done is to ensure that the error process in the estimating equation is residually uncorrelated and also captures the possibility that Y_t is characterized by a higher order autoregressive process. Thus the inclusion this lagged value of the dependent variable were clean up any serial correlation in ΔY_t . The lag length is dictated by the frequency of the data as well as the sample size and for annual data one or two

lags usually suffices (Wooldridge, 2009). In this ADF we still test whether $\delta = 0$ and the test follows the same asymptotic distribution as the DF statistics, so the same critical values can be used.

3.2.3.2 Phillips Perron test

Phillips-Peron test (named after Peter C.B. Phillips and Pierre Perron) is a unit root test. That is, it is used in time series analysis to test the null hypothesis that a time series is integrated of order 2. Like the Augmented Dickey-Fuller test, the Phillips-Perron test addresses the issue that the process generating data for Y_t might have a higher order of autocorrelation than is admitted in the test equation-making Y_{t-1} endogenous and thus invalidating the Dickey-Fuller t-test. Though the Augmented Dickey –Fuller test addresses this issue by introducing lags of ΔY_t as regressor in the test equation, the Phillips- Perron test makes a non- parametric correction to the t-test statistic. The test is highly with respect to unspecified autocorrelation and heteroscedasticity in the disturbance process of the test equation. A Then unit root test at level and at first difference has been designed to test Stationary and non-stationary of the data series at both ADF and PP test statistics.

3.2.4 Model identification

3.2.4.1 Lag length selection

Lag length selection is one of the most important steps after stationary test and before co-integration test. Hence, we employed the information criteria methods like Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC), Hannan-Quinn information criterion (HQIC), Likelihood ratio (LR), and Final prediction error (FPE), show the optimal lag length where the information criterion is smallest. The number of lags for unit root test is determined by referring to Akaike's Information Criterion (AIC) and Likelihood-Ratio test. It is known that the more lags there are, the less the degrees of freedom are. When we determine the number of lags, we choose the one with the minimum AIC and LR. Other test like SBIC, FPF and HQIC can also be used. If the AIC value are not minimized using the same model, we instead apply a likelihood-ratio (LR) test (Johannes 1995). The LR-statistic can be expressed as follows.

$$LR = -2(\log L_{(k)} - \log L_{(k+1)}) \sim \chi^2_{\alpha}(n^2)$$

Where k is the lag order, L is the maximized likelihood of the model and n is the number of variables.

If $LR \leq \chi^2_{\alpha}$, we do not reject the null hypothesis that all the estimates in the coefficient matrix are zero. Then we can reduce the lag order until the null hypothesis is rejected.

3.3 VEC Model

3.3.1 Johansen Co-integration Test

Before VEC model estimation, number of co-integrating equations should be defined. In order to do that, Johansen co-integration test is run by using lagged values of variables. The number of lags is defined based on the criteria that used in VAR model. By running this test, it is checked whether the variables are co-integrated or not, which indicates whether there is a long-run relationship between them. The hypotheses for this test are:

H_0 : *There are no co – integration / relationships*

H_1 : *There is at most one co – integration /relationships*

3.3.2 VEC Estimation

After running Johansen co-integration test and finding co-integrating vector, VEC estimation can be done. The long run relationship between variables can be analyzed through looking at co-integration equations. It also enables one to analyze long-run relationship with co-integrating error which implies break points or disturbances in the long run equilibrium, Moreover, short-run relationship can be observed based on changes of the lagged values in VEC estimation which gives details of the relationship regarding past and current values of variables and explain causality among them.

3.3.3 Model Diagnostics

A wide range of procedures is available for checking the adequacy of VAR and VECMs. They should be applied before a model is used for specific purpose to ensure that it represents the data adequately.

3.3.3.1 Test of Residual Autocorrelation (Breusch-Godfrey Serial Correlation)

In Ordinary Least Squares (OLS) regression, time series residuals are often found to be serially correlated with their own lagged values. Serial correlation means (a) OLS is no longer an

efficient linear estimator, (b) standard errors are incorrect and generally overstated, and (c) OLS estimates are biased and inconsistent if, as in this paper, a lagged dependent variable is used as a regressor.

This test is an alternative to the Q-Statistic for testing for serial correlation. It is available for residuals from OLS, and the original regression may include autoregressive (AR) terms. Unlike the Durbin-Watson Test, the Breusch-Godfrey Test may be used to test for serial correlation beyond the first order, and is valid in the presence of lagged dependent variables. The hypothesis of the Breusch-Godfrey Test given by;

H_0 : *Residuals are not serially correlated*

H_1 : *Residuals are serially correlated*

The Breusch-Godfrey Test regresses the residuals on the original regressor and lagged residuals up to the specified lag order. The number of observations multiplied by R^2 is the Breusch-Godfrey Test statistic.

3.3.3.2 Normality of the Residuals

The Jarque-Bera normality tests for univariate and multivariate series are implemented and applied to the residuals of a VAR (p) as well as separate tests for multivariate Skewness and kurtosis (Bera and Jarque 1980, 1981; Jarque and Bera 1987; Lutkepohl 2006). A multivariate version of this test can be computed by using the residuals that are standardized by a Choleski decomposition of the variance-covariance matrix for the centered residuals. Please note, that in this case the test result is dependent upon the ordering of the variables. The hypothesis to test normality of residual is given by:

H_0 : *Residuals are not normally distributed*

H_1 : *Residuals are normally distributed*

The test statistics $JB_{mv} \sim \chi^2(k)$ and the multivariate Skewness, s_3^2 , and Kurtosis test, s_4^2 are distributed as $\chi^2(k)$.

3.3.4 Granger Causality Test

Based on the VAR estimation, Granger causality test is run in order to observe the causality and its direction among variables or Granger causality test is implemented to identify how much the one factor significant in forecasting the other one (granger, 1987). This test simply checks whether or not the past values of one variable would explain or imply a change in present values of the other variables. In that respect, a change in the past values of one variable would enable one to predict present values of the other variables. In principle, if this is the case that changes in X variable is observed and then changes in Y variable is happened, then it can be said that X Granger cause Y . In other words, if past values of X variable increases the prediction or forecasting of Y variable, then it is said that X Granger cause Y . The hypotheses of Granger causality test are the following:

$$H_0: Y_t \text{ does not cause } X_t$$

$$H_1: Y_t \text{ cause } X_t$$

Where : Y_t and X_t are random time series variables.

CHAPTER FOUR

4. RESULT AND DISCUTION

4.1 Data Description

The study is based on the annual time series data observed from 1980/81-2014/15 where used to appropriate model. The secondary data where obtained from Ethiopian Ministry of Finance and Economics Development and National Bank of Ethiopia. The number of observation is 35, in fact the number of observation for some of the variables are less than 35. The discussion of this thesis begins with describing the data set and then extended to the results from the model selection procedure. Finally results will be interpreted and discussed. The data analysis was performed by using Eviews 6.

4.2 Descriptive statistics

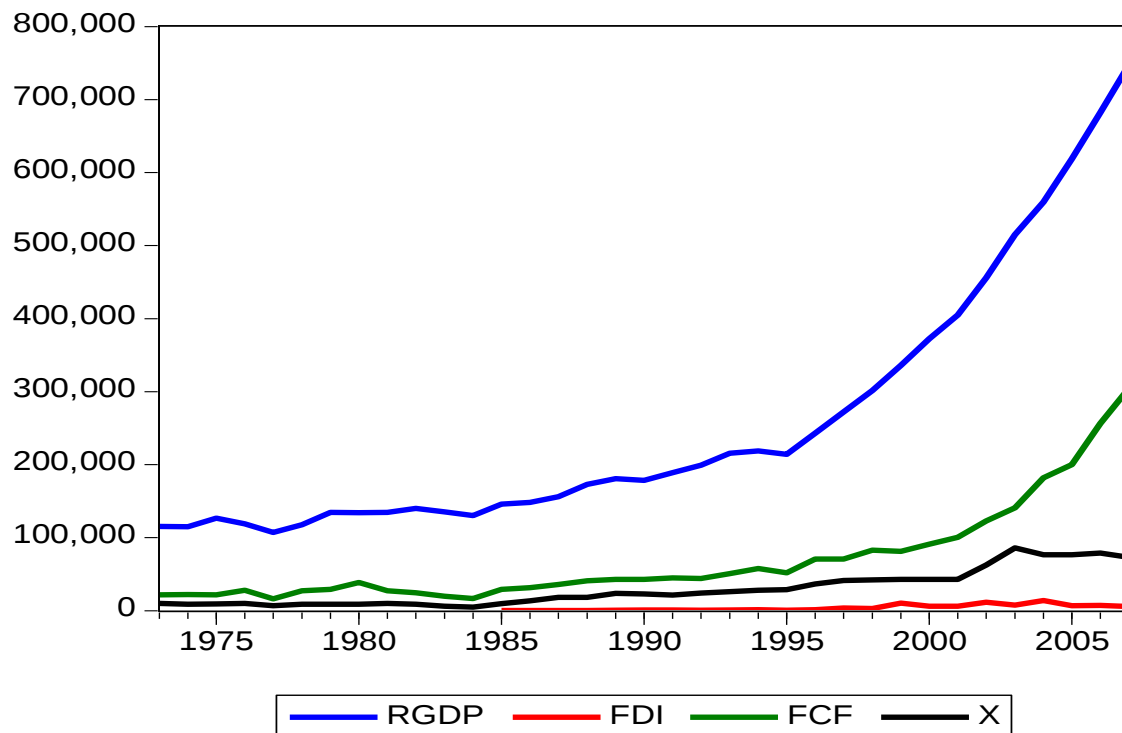
In the empirical analysis, four aggregate series namely, Real Gross Domestic Product (RGDP), Foreign Direct Investment (FDI), Fixed Capital Formation (FCF), and Export (X) were used (**table 4.1**). Some descriptive statistics including the number of observation, sum of the observation, mean, standard deviation, minimum and maximum values of the series under study are presented in **Table 4.1**. The results show that the values of summary statistics are more or less similar in magnitude.

Table 4.1 Descriptive statistics for the variables used in the analysis

Variables name	Observation	Sum	Mean	Maximum	Minimum	Std. Dev.
RGDP	23	7,528,876	327,342	748,021	145,798	184,285
FDI	23	89,400	3,887	13,726	57.28	4,138
FCF	23	2,176,828	94,645	305,056	29,027	75,009
X	23	937,223	40,749	85,955	9,783	23,495

Source: Author's Estimation using Eviews

Figure 4.1: Graphical approach for unit root test before stationary of RGDP, FDI, X and FCF



Source: Author's Estimation using Eviews 6

The line plot of the Y_t is presented in Figure 4.1. Clearly, the GDP, FDI, FCF and X have an increasing trend showing that it is a non-stationary process.

4.3 VAR Modeling

4.3.1 Testing the Stationarity

Before starting any econometric analysis, unit root tests of related series must be made in order to be careful of “artificial regression” problem i.e. first it must be investigated the time series properties of RGDP, FDI, FCF, and X. Because the standard econometric theory of time series data requires that variable should be stationary if an inference is to be adequate. That means, non-stationary in the data is often considered a problem in empirical analysis and as such it needs to be checked in order to prevent ending up with misleading results. Therefore, it is necessary to test for stationary of time series variables before running any sort of time series analysis. This study uses the ADF and PP test to detect the presence of unit roots in the time series. As shown in **Table 4.2**, the same conclusion is obtained regarding the assumption of stationary on GDP,

FDI, FCF and X like we expected from the line plot. i.e. the test were done both at level and with intercept and trend; The entire variables were not found stationary at level. This can be seen by comparing the observed values in absolute terms of both the ADF and PP test statistics with the critical values also in absolute terms of the test statistics at the 5% level of significance. Hence, the result shows insignificant at 5% levels of significance; which fail to assume stationary or there is a unit root in the data series.

Table 4.2: Unit root test result (At level)

Variables Name	Level with intercept				Level with intercept and trends			
	T- statistics		Prob*		T-statistics		Prob*	
	ADF	PP	ADF	PP	ADF	PP	ADF	PP
RGDP	12.17446	13.07481	1.0000	1.0000	5.011176	5.522789	1.0000	1.0000
FDI	-1.073889	-1.748008	0.7060	0.3947	-3.551400	-3.625263	0.0583	0.0507
FCF	7.407993	18.32294	1.0000	1.0000	6.131144	20.25537	1.0000	1.0000
X	0.225000	0.269798	0.9703	0.9731	-2.024636	-2.011999	0.5675	0.5741

Source: Author's Estimation using Eviews 6

The result of ADF and PP unit root tests are presented in the above table (**Table 4.2**). As it is seen, the null hypothesis is not rejected at the levels of variables. Therefore, we need to take first differences of variables (RGDP, FDI, FCF and X) in order to see whether they are stationary or not at first difference. The results that are presented in the **Table 4.3**

Table 4.3 ADF and PP Stationarity test at 1st difference of GDP, FDI, X and FCF

Variables Name	Level with intercept				Level with intercept and trends			
	T- statistics		Prob*		T-statistics		Prob*	
	ADF	PP	ADF	PP	ADF	PP	ADF	PP
RGDP	1.020879	-0.762175	0.9958	0.8166	-0.894715	-2.859551	0.9440	0.1878
FDI	-8.757003	-8.757003	0.0000	0.0000	-8.561540	-8.561540	0.0000	0.0000
FCF	1.798554	-2.085821	0.9996	0.2513	0.366083	-4.132587	0.9982	0.0136
X	-4.638240	4.540056	0.0007	0.00010	-4.872566	-4.550866	0.0023	0.0049

Source: Author's Estimation using Eviews 6

All the variables were differenced once and both the ADF and PP test were conducted on them as shown in **Table 4.3**. The coefficients compared with the critical values (5% level of

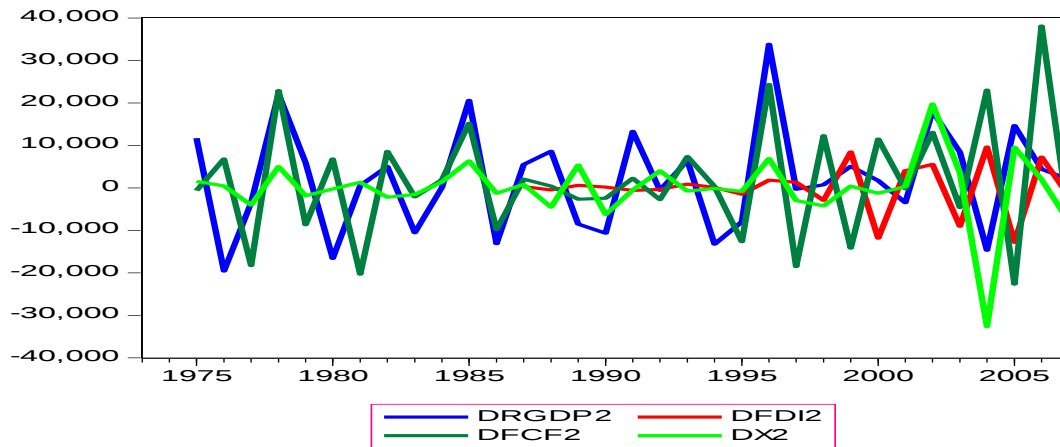
significance) tells that all the variables were also found non-stationary at first difference except FDI and X at level with intercept and level with intercept and trend in ADF and PP test. But on the basis of this, the null hypothesis of non-Stationarity is accepted. This implies that the variables are not integrated of order one. Therefore, we need to take second differences of variables (RGDP, FDI, FCF and X) in order to see whether they are stationary or not at second difference level. The result is arranged as shown below.

Table 4.4 ADF and PP Stationarity Test at Second Difference Integration

Variables Name	Level with intercept				Level with intercept and trends			
	T- statistics		Prob*		T-statistics		Prob*	
	ADF	PP	ADF	PP	ADF	PP	ADF	PP
RGDP	-8.203104	-8.538261	0.0000	0.0000	-8.644938	-23.85840	0.0000	0.0000
FDI	-8.396323	-40.61428	0.0000	0.0000	-8.578200	-42.27040	0.0000	0.0000
FCF	-14.24464	-14.02471	0.0000	0.0000	-15.31543	-16..29964	0.0000	0.0000
X	-7.335431	-12.61706	0.0000	0.0000	-7.263912	-14.11759	0.0000	0.0000

The results that are presented in both **Table 4.4** and **Figure 4.2** indicate that all series are stationary. This means that the Second differences of GDP, FCF, X and FDI variables are co-integrated of order two. Because, the coefficient compared with the critical value (5% level of significance) tells that all the variables in ADF and PP tests were found stationary. Meaning that, we can reject null hypothesis of non Stationarity rather we accept alternative hypothesis. Therefore, we decided all variables are stationary in PP and ADF test and it is safe to conclude that the variables are stationary and integrated of order two.

Figure 4.2: Graphical approach for unit root test after stationary of GDP, FCF, FDI and FDI



Source: Author's Estimation using Eviews 6

4.4 Model identification

4.4.1 The VAR Order Selection Analysis

Information criteria method is the optimal ways to identify the proper lag length for VAR model. To determine appropriate lag length for the VAR model; LR, FPE, AIC, SBIC, HQIC were used. So the lowest/smallest information criteria value and number of star are the essential ways to determine the optimal lag length. Among each information criterion AIC value is better to select lag order of the model. Since our sample size is small; when applying the VAR model, the number of lags should not have to be large given the minimum Information criteria rules. So in order to avoid the loss of information, we determine that the optimal number of lags is 2 as shown in **Table 4.5**.

Table 4.5: VAR model lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-376.2478	NA	6.13e+15	42.02754	42.12647	42.04118
1	-366.8231	15.70794	3.38e+15	41.42479	41.72158	41.46571
2	-357.4430	13.54894*	1.90e+15*	40.82700*	41.32165*	40.89521*
3	-355.5928	2.261415	2.55e+15	41.06587	41.75838	41.16135

Endogenous: DRGDP2 DFDI2

* Indicates lag order selected by the criterion

Source: Author's Estimation using Eviews

So from the above **Table 4.5** result, all lag section criteria choose optimal lags two at 5% level of significance. i.e. all information criteria were supported at lag length two and lowest information criterion value was found here. We can conclude that there is a possibility of existence of co-integration by applying the Johansson (1991) Trace and Maximum- Eigen value co-integrating tests. Therefore the estimated VAR model can be expressed as VAR model-two.

4.5 Co-integration Analysis

Once we know VAR lag order, we can apply the Johansson maximum Likelihood method of co-integration to obtain the number of co-integration vectors. The theory of co-integration proposed by Engel and Granger (1987) is considered as one of the most important new concept in the field of econometrics and time series analysis. The co-integration test clearly identifies the real long-term relationship between the variables in the model. Most financial variables are not stationary, this implies that the statistical estimation may sound good but in reality it is incorrect. Co-integration, therefore allows estimating the long-term relationship between stationary variables integrated of same order. Furthermore, the Johansen (1988) test was preferred to determine the existence and number of co-integration between variables in the model by using the following two tests. Namely, the trace statistics test and the maximum Eigen value tests were be used to determine the number of co-integrating vectors are present. So the hypotheses for these tests are: - there is no co- integration (null hypothesis) and there is at most one co-integration (alternative hypothesis). Since we discovered through ADF and PP tests that GDP and FDI are integrated of order two, so, we can check for co-integration, since all variables are stationary of order two.

Table 4.6: Unrestricted Co-integration Rank Test (Trace and Maximum Eigen Value)

Hypothesized No. of CE(s)	Eigen value	Trace statistics	0.05critical value	Prob**	Max-Eigen statistic	0.05critical value	Prob**
None*	0.605555	30.93850	15.49471	0.0001	16.74494	14.26460	0.0199
At most 1*	0.545488	14.19355	3.841466	0.0002	14.19355	3.841466	0.0002

Trace and Max-eigenvalue statistic test indicates 2 co-integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's Estimation using Eviews

Normalized co-integrating coefficients (standard error in parentheses)

DRGDP2	DFDI2
1.000000	-4.157028
	(1.52290)

Table 4.6 indicates, the null hypothesis of no co-integration equation is rejected by both tests. Because, the values of trace statistics were (30.94, 14.2) greater than critical value (15.5, 3.8) respectively, as well as their respective probability value for both test is small and less than 5% level of significance. Hence, the null hypothesis was rejected rather we accept the alternative hypothesis. In another hand the Max-Eigen value of co-integration test was (16.8, 14.2) greater than critical value (14.3, 3.8) respectively and probability value is less than 5%. So there is co-integration or long-run relationship among them.

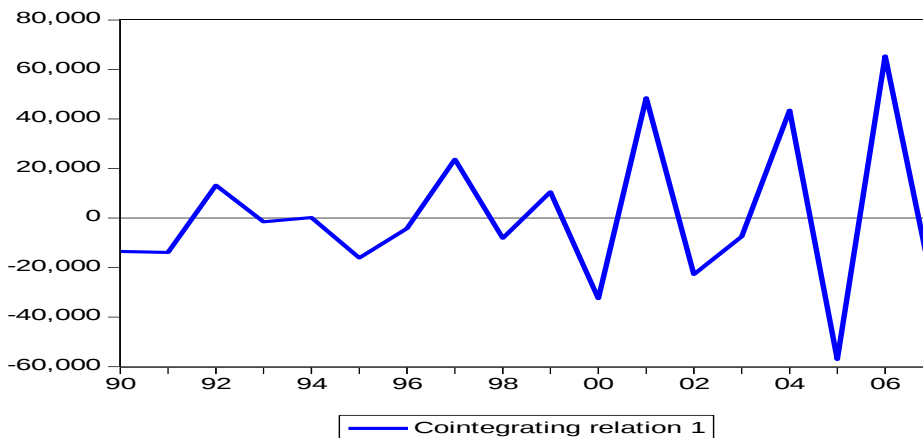
Consequently, the co-integration vector is given by: $\beta = (1, -4.157028)$

The values correspond to the co-integration coefficients of GDP (normalized to one), and FDI, respectively. The co-integration equation is given by.

$$\text{GDP} = 2467.387 + 4.157028 \text{FDI}$$

To support the statistical test of co-integration presented above, we represented the co-integration graph generated from the estimated VAR model at the selected order. The co-integration graph shown in **Figure 4.3** below, confirmed the existence of co-integration among the variable used in the study.

Figure 4.3 Co-integration relation graphs



Source: Author's Estimation using Eviews

4.6 Vector Error Correction Model

After determined variables in the Johansen co-integration test; the result indicates that the two variables are co-integrated; we keep estimating the short run behavior and the adjustment to the long run relationship, which is represented by VECM.

4.6.1 Model Estimation

Coefficient estimates of the VEC model are presented in **(table A3)**. This table consists of two parts; the first part covers the detail of the co-integration vector which is derived by normalizing the GDP. The result shows that, the long run coefficients of GDP have a positive long run relationship with FDI as expected in the theory. The long run equation is specified as follows:

$$GDP = 2467.387 + 4.157028FDI$$

The value 4.157028 indicates that a unit increase in the FDI encourages on average, leads to an increase of about 4.157028 units in GDP.

The second part of the **(table A3)**, indicates adjustment coefficients of the error correction term (**cointEq1**) which identifies the fraction of the long-term gap that is closed in each period (Year). The first equation GDP equation (1) below; the coefficient have a negative sign and significant with large t-values (-1.59067); which shows the remaining long term GDP departs by about 1.40 times in each period, while the gap in the FDI equation close by about 0.509 times in each year (Eqn (2). The remaining long-run for FDI closes by 50.99% in each period (year).

Finally, using the error correction term as another independent variable in the unrestricted VAR model we can estimate the following Vector Error Correction Model.

Model of real gross domestic product (RGDP2):-

- $D(DRGDP2) = C(1)*(DRGDP2(-1) - 4.15702758784*DFDI2(-1) - 2467.38691713) + C(2)*D(DRGDP2(-1)) + C(3)*D(DRGDP2(-2)) + C(4)*D(DFDI2(-1)) + C(5)*D(DFDI2(-2)) + C(6) + C(7)*FCF + C(8)*X \dots \dots \dots \text{Eqn (1)}$
- $\Delta(DRGDP2) = -1.39680*(DRGDP2(-1) - 4.15702758784*DFDI2(-1) - 2467.38691713) + 0.27799601*\Delta(DRGDP2(-1)) - 0.177808*\Delta(DRGDP2(-2)) - 4.0242398*\Delta(DFDI2(-1)) - 1.8543982*\Delta(DFDI2(-2)) - 6498.4701 - 5.23542928472e-05*FCF + 0.1606656*X \dots \dots \dots \text{Eqn (1)}$

Model of foreign direct investment (FDI):-

- $D(DFDI2) = C(9)*(DRGDP2(-1) - 4.15702758784*DFDI2(-1) - 2467.38691713)$
 $+ C(10)*D(DRGDP2(-1)) + C(11)*D(DRGDP2(-2)) + C(12)*D(DFDI2(-1))$
 $+ C(13)*D(DFDI2(-2)) + C(14) + C(15)*FCF + C(16)*X \dots\dots\dots Eqn (2)$
- $\Delta(DFDI2) = 0.50988*(DRGDP2(-1) - 4.15702758784*DFDI2(-1) - 2467.38691713$
 $- 0.26932*\Delta(DRGDP2(-1)) - 0.17773*\Delta(DRGDP2(-2)) - 0.02095*\Delta(DFDI2(-1))$
 $- 0.4395299*\Delta(DFDI2(-2)) + 1783.14892 - 0.01556*FCF - 0.0103280*X \dots\dots\dots Eqn (2)$

Where: Δ stands for second difference (D), the value in the bracket is the error correction term and the coefficients of error correction term are called adjustment coefficient.

Generally each independent variable is associated with each coefficient. **(Table A4 and A5)**, So to identify the significant relationship between the dependent variable and the independent variables of the above equation (1) and (2) individually, we state the p-values. Hence the general guide line is if the p-value is greater than 5%, such independent variables is not significant to explain the dependent variable (RGDP2) and (FDI2), while, if the p-value is less than 5%, such independent variables is significant to explain the dependent variables (RGDP2) and (FDI2). Therefore from the above equation, Eqn (1); $C(1)*[RGDP2(-1), FDI2(-1)]$, $C(2)*D(RGDP2(-1))$, $C(3)*D(RGDP2(-2))$, $C(4)*D(FDI2(-1))$, $C(5)*D(FDI2(-2))$, $C(7)*FCF$, and $C(8)*X$ independent variables are not significant variables to explain the dependent variable (RGDP2), because, p-value is greater than 5%. Similarly in Eqn (2); $C(9)*[(RGDP2(-1), FDI2(-1))]$ independent variables are significant variables to explain the dependent variable (FDI2), because, p-value is less than 5%. Meaning that, 0.03 is less than 5%. But, the rest independent variables are not significant variables to explain the dependent variable (FDI2), such as $C(10)*D(RGDP2(-1))$, $C(11)*D(RGDP2(-2))$, $C(12)*D(FDI2(-1))$, $C(13)*D(FDI2(-2))$, $C(15)*FCF$, and $C(16)*X$; in equation (Eqn2). Since p-value is greater than 5%.

However, due to the above two equation results especially in Eqn (1) no one independent variable individually explains the dependent variable (RGDP). Therefore, it is better to see the significance of independent variables jointly to explain the dependent variables (RGDP and FDI) based on Wald coefficient test. So the general guide line is, if the coefficients of the independent variables are jointly equal to zero, and if p-value is greater than 5%, we can't reject the null

hypothesis like $C(1)=C(2)=0$). That means the independent variables are not jointly significant variables to influence the dependent variables (RGDP2 and FDI2). But if the coefficients of the independent variables are not jointly equal to zero and if p-value is less than 5%, we reject the null hypothesis like $C(1) = C(2) \neq 0$, i.e. The independent variables are jointly significant variables to explain the dependent variables (RGDP2 and FDI2). The result is arranged as shown below **table 4.7**

Table 4.7 Wald coefficient test

Equation one (RGDP)			Equation two (FDI)		
Coefficient of the independent variables	Independent variables	Probability	Coefficient of the independent variables	Independent variables	Probability
$C(2)=C(3)=0$	RGDP(-1)& RGDP(-2)	0.2393	$C(10)=C(11)=0$	RGDP(-1)& RGDP(-2)	0.0846
$C(4)=C(5)=0$	FDI(-1)&FDI(-2)	0.3619	$C(12)=C(13)=0$	FDI(-1) & FDI(-2)	0.0015***
$C(7)=C(8)=0$	FCF & X	0.7045	$C(15)=C(16)=0$	FCF & X	0.3416
$C(2)=C(4)=0$	RGDP(-1)&FDI(-1)	0.0230***	$C(10)=C(12)=0$	RGDP(-1)&FDI(-1)	0.0000***
$C(3)=C(5)=0$	RGDP(-2) & FDI(-2)	0.0478***	$C(11)=C(13)=0$	RGDP(-2) & FDI(-2)	0.0000***
$C(2)=C(7)=0$	RGDP(-1) & FCF	0.9096	$C(10)=C(15)=0$	RGDP(-1) & FCF	0.1403
$C(2)=C(8)=0$	RGDP(-1) & X	0.8605	$C(10)=C(16)=0$	RGDP(-1) & X	0.1690
$C(3)=C(7)=0$	RGDP(-2) & FCF	0.8780	$C(11)=C(15)=0$	RGDP(-2) & FCF	0.0581
$C(3)=C(8)=0$	RGDP(-2) & X	0.7315	$C(11)=C(16)=0$	RGDP(-2) & X	0.0740
$C(4)=C(7)=0$	FDI(-1) & FCF	0.3649	$C(12)=C(15)=0$	FDI(-1) & FCF	0.8036
$C(4)=C(8)=0$	FDI(-1) & X	0.3668	$C(12)=C(16)=0$	FDI(-1) & X	0.9891
$C(5)=C(7)=0$	FDI(-2) & FCF	0.3657	$C(13)=C(15)=0$	FDI(-2) & FCF	0.3452
$C(5)=C(8)=0$	FDI(-2) & X	0.3814	$C(13)=C(16)=0$	FDI(-2) & X	0.2501

Therefore in Eqn (1); C (2) with C (4), and C (3) with C (5) are jointly significant variables to determine the dependent variable (RGDP), because, 0.0230 and 0.0478 are less than 0.05. However in Eqn (2); C (12) with C (13), C (10) with C (12) and C (11) with C (13) are jointly significant variables to explain the dependent variable (FDI). Since, 0.0015 0.0000 and 0.0000 respectively are less than 0.05. but the rest independent variables still are not significant variables jointly to explain the dependent variables (RGDP and FDI) in both equation. That means all probability of the independent variables jointly is greater than 0.05.

4.7 Model Diagnostics

We test normality and autocorrelation of residuals for the VEC model. We see that residuals are normally distributed and there is no autocorrelation in this model.

4.7.1 Test of Residual Autocorrelation /serial correlation

The test for residual serial correlation was performed based on Breusch Godfrey serial correlation LM test. Therefore the test is determined by p- value, i.e. If p-value is greater than 5%, there is no serial correlation in the residual of the model and the null hypothesis are not reject rather we accept. The null hypothesis is no serial correlation in the residual of this model. So the **(Table A6)** presents the residuals of the Breusch Godfrey test for VEC model residual serial correlation. The test is used to test for the overall significance of the residual autocorrelations up to lag 2. The result is insignificant at 5% level of significant which failed to reject the null hypothesis, i.e. there is no autocorrelation or error terms are not serially correlated.

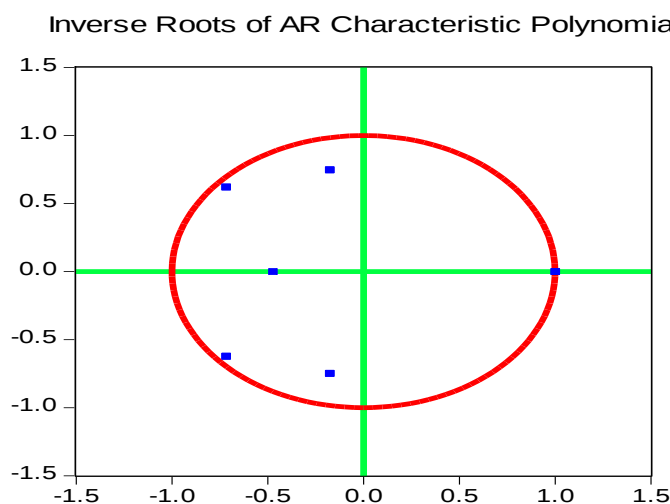
4.7.2 Normality Testing of Residual

Multivariate version of the Jarque Bera tests is used to test the normality of the residuals. It uses Skewness and kurtosis to determine whether the error terms are multivariate normally or not. In addition to this we look the p- value, i.e. if p – value is greater than 5%, we can't reject the null hypothesis. Because null hypothesis refers that residual are normally distributed. The results in **(Table A7)** indicate that the null hypothesis has failed to be rejected. Meaning that, the error term is normally distributed at 5% level of significance.

In addition to the above test, we conducted stability check test for VEC **(Table A8)** and found to impose two unit roots indicating that the VECM is stable and there is two potentially co-

integration equation in the system. Similarly, the roots of characteristic Polynomial as clearly shown below **figure 4.4** complement the existence of the two co-integration equations.

Figure 4.4 inverse roots of AR characteristic Polynomial



Source: Author's Estimation using Eviews

Inverse root of AR characteristic Polynomial shows no point resides outside the circle. This again confirms the VECM is stable and there is potentially co-integrated equation in the system. The result showed each error terms is normally distributed this confirmed the existence of co-integration among the variables. From a statistical point of view, co-integration of two economic variables implies that they move together over time. So that deviation from their long-term trend was adjusted over time (Engle and Granger, 1987). Normally the result shows the null for no-integration is rejected at 5% level of significance by the Trace and Max- Eigen statistics. Here, it can be conclude that there is a long-run relationship among the variables which is explained by a linear combination of $I(2)$.

4.7.3 Lag Exclusion Test

To check whether the chosen lag is optimal, Wald lag exclusion test is used. Given that VAR modeling requires uniform lag length for each variable, the result in **Table 4.8** shows that second lag is significant for all variables at 5 percent level of significance. That is, the value in the square brackets indicates probability value for the corresponding chi-square statistics. Therefore; the VAR is found suitable for the data set and hence could be adopted.

Table 4.8: Lag exclusion test

VEC Lag Exclusion Wald Tests

Date: 12/21/16 Time: 14:29

Sample: 1973 2007

Included observations: 18

Chi-squared test statistics for lag exclusion:

Numbers in [] are p-values

	D(DRGDP2)	D(DFDI2)	Joint
DLag 1	7.541001 [0.023041]	25.25501 [3.28e-06]	27.70864 [1.43e-05]
DLag 2	6.082757 [0.047769]	22.20406 [1.51e-05]	22.92343 [0.000131]
Df	2	2	4

4.8 Granger Causality test results

In order to determine whether real GDP and FDI affect each other over time, a pairwise granger causality test is performed. The result of pairwise granger causality Wald test is shown in the **table 4.9**.

Table 4.9 VEC Granger causality test

VEC Granger Causality/Block Exogeneity Wald Tests

Dependent variable: D(DRGDP2)

Excluded	Chi-sq	df	Prob.
D(DFDI2)	6.435499	2	0.0400
All	6.435499	2	0.0400

Dependent variable: D(DFDI2)

Excluded	Chi-sq	df	Prob.
D(DRGDP2)	1.492401	2	0.4742
All	1.492401	2	0.4742

Since, we understand two models, (such as RGDP2 and FDI2). To determine the hypothesis we depend on p-value. Means, if p-value is greater than 5%, we can't reject null hypothesis and no granger causality between them. But if p-value is less than 5%, we can also reject null hypothesis and has granger causality them. Therefore from the above **Table4.9**, the result explains the existence of a unidirectional causality between the variables that runs from foreign direct investment to real gross domestic product. Implying that FDI does influence economic growth (RGDP), or it implies that past values of FDI has significantly contribute to the prediction of economic growth and we can't accept H_0 , Because $(0.04 < 0.05)$. But real gross domestic product (RGDP) doesn't affect foreign direct investment. Means p-value is greater than 5%, because $(0.47 > 0.05)$ and we can't reject H_0 rather we accept. This result was similar to by Dejene G, 2014 in Ethiopia. But his study investigated the impact of foreign direct investment (FDI) on economic growth of Ethiopia in agreement of four other core macroeconomic variables that include domestic investment, Inflation, government consumption and trade. Generally the above result indicates the granger causality or association between RGDP and FDI in Ethiopia for the period 1980/81-2014/15.

CHAPTER FIVE

5. SUMMURY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This paper studied the impact of Foreign Direct Investment (FDI) on economic growth of Ethiopia from the period 1980/81-2014/15. The paper totally organized by five chapters. The first chapter explores the background of this study and statement of the problem by elaborating on what FDI needs, its impacts both positive and negative and hypothesis of the study, Objective of the study, significance of the study, limitation of the study, organization of the paper, and research question. The second chapter goes into various definitions, and theories and empirical paradigm regarding on FDI and economic growth. So the vast body of literature states that FDI helps to prompt economic growth through transfers of technology, raises level of knowledge and skill and capital accumulation. Therefore Solow's growth model is my theoretical framework of the finding. Because, the theory clearly stated that capital accumulation and technological progress is an important driver for host country like Ethiopian economic growth. Some empirical studies also approve the finding (Demollo, 1997; Ayanwale, 2007; Agrawal, 2005). Chapter three also refers with the research method to be applied in this study. The next part explains the research design. Based on the research questions, the methodology uses a quantitative research design that helps to identify the numerical characteristics of the effects of FDI on economic growth in Ethiopia. The next chapter offers a detailed report of the findings in the case study. Findings from chapter four show that there is a significant positive relationship between foreign direct investment and economic growth in Ethiopia. This positive relationship means that there is a direct proportionate relationship between foreign direct investment and economic growth. This means that more foreign direct investment leads to higher levels capital accumulation and technological progress. Based on the above, we need to enhance more foreign direct investment in order to promote economic growth. Policy implications of these findings are that FDI is a prerequisite for economic growth in Ethiopia. The last chapter was also shows summery, conclusion and policy recommendation.

5.2 Conclusion

This study examines the impact of foreign direct investment on economic growth in Ethiopia using vector autoregressive methodology. Fixed capital formation and export have been included as independent variables. The econometric approach used was co-integration and Vector Error Correction Model (VECM). The data are used time series covering the period 1980/81-2014/15. The statistical properties of the series was tested especially unit root test for Stationarity and Johansen co-integration test was employed to discover the long relationship among variables. While Granger Causality test was also employed to identify the direction of causality and Vector Error Correction Model (VECM) was adopted to estimate long run and short run effect of FDI on economic growth. Econometric and statistical methods have been applied in order to answer the research question.

Generally, the result of stationary test indicates that all the series (variables) were integrated of order two (two differences) that is $I(2)$ by using Augmented Dickey Fuller (ADF) and Phillips Perron (PP) and therefore conform to stationary at second difference. The Johannes co-integration result shows that the variables are co-integrated. The Trace and Max-Eigen statistic test show co-integration equations at 5% level of significance. A result of co-integration test indicates that there is long run relationship among variables; meaning that all variables are moving together in the long run (long run association ship). That means, the **first** basic research question (i.e. is there a causal relationship between FDI and economic growth in Ethiopia?) were answered. In addition to this, this question was answered by pairwise Granger Causality test. Because, the tests showed that there is a unidirectional causality between foreign direct investment and economic growth that run from foreign direct investment to economic growth. Implying that FDI does influence economic growth of Ethiopia, but RGDP was does not granger cause of FDI. This result was confirmed /approved by Dejene G, 2014; Tang and Selvanathan, (2008), Magnus and Fosu, (2008). So it is one side feedback and it's completely consist with theory proposed that more FDI inflows increase stocks of capital. In other word, FDI can supplement the current stocks of awareness and technology in the host economy through labor preparations systems, skill acquirement and diffusion an new managerial performs and organizational appointments.

The **second** research question of this paper is also (does foreign direct investment promotes economic growth in Ethiopia?). So Vector Error Correction Model estimation results provide sufficient answer. The result estimated method (VECM) under VAR system shows that FDI are positive and statistically significant determinants of economic growth with the test at 5% level of significance in the long run. Short run estimation results suggested that both coefficient of lagged variables RGDP (-1) and FDI (-1), RGDP (-2) and FDI (-2) have positive effects on economic growth and were statistically significant jointly. In other words they are jointly influencing the dependent variable in the short run. Generally based on empirical finding of this paper we can say that FDI has plays important role to economic growth and promote economic growth in short run. The coefficient of error correction term (speed of adjustment) toward the long run equilibrium was large high it was about (0.5099). Sense that if there was deviation from the equilibrium level only (50.99%) is corrected in one year as variables moving towards equilibrium in the long run. This is most probably due to the fact that there are an other variables that affect the economic growth which are not included to the empirical model such as labor, human capital, saving and government expenditure. FDI can be seen from this findings as an essential part of an open and operative worldwide economic system which organizes a major promoter to growth.

5.3 Recommendation

Foreign direct investment is an important indicator to boost the economic growth of Ethiopia as a medium in order to acquire skills, stock capital, management know-how and access to new markets knowledge, technologies and at the same time to reduce debts. FDI does influence and energetic for Ethiopian economic growth, meaning that, it's completely consisting with the result finding and theory proposed that more FDI inflows increase economic growth. Therefore, the results show that there is a stable, long-run relationship between foreign direct investment and economic growth in Ethiopia from the period 1980/81-2014/15. Because that, a unit increase in the FDI encourages on average, leads to an increase of about 4.16units in GDP. Based on the findings of this study plus theoretical basis, and empirical evidences, the following policy recommendations are recommended to attract and sustain more FDI in Ethiopia. Due to the positive effects of FDI on the Ethiopian economy, the government should continue to keep its open door policy to FDI and MNCs in the future. The government also needs to go a step further and actively seek to attract FDI by advertising our economy and eventually set up national investment promotion agencies regarding on investment promotion policies. Ethiopia should adopt a positive approach towards FDI promotion, and clearly look for ways to increase its benefits by attracting more bilateral and multilateral trade agreements, improving the quality of infrastructure by way of channeling more resources to its development. Under these types of policies, foreign investors are targeted at the industry level in order to meet Ethiopia's specific needs that fit in with its developmental priorities.

In addition to this especially based on the practical observations the following recommendations are suggested. Resource utilization by investor including land and water should get better attention and needs strong regulation to keep FDI trend healthy, Investment proclamation of Ethiopia should consider time based situation and also there must be amendment to protect the country economy from the foreign investor, The investment climate of Ethiopia needs at most care by all stakeholders and must back up by laws and regulations as well and Degree of openness (trade liberalization), Economic and political stability are so essential to achieving sustainable capital inflow, to achieve this, approving an investment friendly environment by enhancing foreign investor legal protection, restructuring procedure for businesses. If the above remarks are look over by the concerned bodies the current FDI development from European Union d other major trade partners will attract a win-win project in Ethiopia.

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APPENDIX

Table:-A1 RGDP, FDI, FCF and X Data, (in million birr)

G.Y	EFY	RGDP	FCF	FDI	X
1980/81	1973	115224.11238	21880.29572	NA	9872.16215
1981/82	1974	115110.57556	22075.35370	NA	8778.05781
1982/83	1975	126706.98715	21632.01668	NA	9227.03059
1983/84	1976	118729.13523	28002.45495	NA	10136.31517
1984/85	1977	107221.23738	16066.81869	NA	7006.56011
1985/86	1978	117837.32505	27052.04092	NA	8889.59963
1986/87	1979	134380.23714	29349.56101	NA	8924.53030
1987/88	1980	134308.81324	38447.71901	NA	8708.37999
1988/89	1981	134767.01362	27202.43476	NA	9808.74250
1989/90	1982	140247.62402	24516.09897	NA	8692.68909
1990/91	1983	135164.66433	19684.29879	NA	6023.20078
1991/92	1984	130176.97769	16754.46178	NA	4726.70569
1992/93	1985	145798.54619	29026.60967	153.8761	9782.59615
1993/94	1986	148275.62095	31468.85113	87.6576	13584.68938
1994/95	1987	156247.19547	35957.63415	309.3994	18187.86640
1995/96	1988	172839.41230	40856.44050	57.276	18232.76220
1996/97	1989	180910.93085	43065.04580	406.4509	23647.50028
1997/98	1990	178301.48708	42820.90386	931.2201	22789.07441
1998/99	1991	188990.35793	44833.86910	870.014	21448.79442
1999/00	1992	199102.15332	44107.90940	449.1135	24120.19302
2000/01	1993	215630.47924	50746.40604	923.5166	26047.13116
2001/02	1994	218896.66898	57704.48814	1478.89	27828.23635
2002/03	1995	214166.13178	51974.93255	530.099	28766.84930
2003/04	1996	243233.53479	70589.84040	1413.216	36606.85097

2004/05	1997	271980.92362	70671.13390	3588.377	41452.14248
2005/06	1998	301449.05038	83052.59233	2803.819	42056.52502
2006/07	1999	335983.09935	81226.60027	10465.21	43057.66963
2007/08	2000	372230.81754	90924.08089	6259.699	42799.87617
2008/09	2001	404996.38646	100416.44481	6095.143	42853.68962
2009/10	2002	455825.63572	122967.06777	11470.56	62643.81663
2010/11	2003	515078.54100	140903.95012	7793.471	85954.96957
2011/12	2004	559621.56400	181854.38055	13725.83	76581.74383
2012/13	2005	618842.22900	200121.62335	6844.169	76774.84648
2013/14	2006	682454.17800	256481.01772	7219.121	78953.12895
2014/15	2007	748021.08600	305056.11001	5523.52	73051.79310

GDP by Expenditure Approach at Constant Prices 2010/11=100

Source:-NBE, MoFED

Table: - A2

Vector Auto regression Estimates

Date: 12/20/16 Time: 21:03

Sample (adjusted): 1989 2007

Included observations: 19 after adjustments

Standard errors in () & t-statistics in []

	DRGDP2	DFDI2
DRGDP2(-1)	-0.338279 (0.22388) [-1.51100]	0.069200 (0.06414) [1.07893]
DRGDP2(-2)	-0.516397 (0.21803) [-2.36848]	0.004173 (0.06246) [0.06681]
DFDI2(-1)	0.184294 (0.68044) [0.27084]	-1.361092 (0.19494) [-6.98223]
DFDI2(-2)	-0.463389 (0.72730) [-0.63713]	-0.785095 (0.20836) [-3.76796]

C	4942.762 (2668.69) [1.85213]	-561.7270 (764.538) [-0.73473]
R-squared	0.381835	0.807207
Adj. R-squared	0.205216	0.752123
Sum sq. resids	1.58E+09	1.30E+08
S.E. equation	10620.30	3042.555
F-statistic	2.161919	14.65418
Log likelihood	-200.1986	-176.4473
Akaike AIC	21.59986	19.09972
Schwarz SC	21.84839	19.34825
Mean dependent	2577.615	-75.97245
S.D. dependent	11912.76	6111.116
Determinant resid covariance (dof adj.)		1.04E+15
Determinant resid covariance		5.67E+14
Log likelihood		-376.6455
Akaike information criterion		40.69952
Schwarz criterion		41.19660

Table: - A3

Vector Error Correction Estimates

Date: 12/20/16 Time: 21:13

Sample (adjusted): 1990 2007

Included observations: 18 after adjustments

Standard errors in () & t-statistics in []

Co-integrating Eqn:	CointEq1	
DRGDP2(-1)	1.000000	
DFDI2(-1)	-4.157028 (1.52290) [-2.72969]	
C	-2467.387	
Error Correction:	D(DRGDP2)	D(DFDI2)
CointEq1	-1.396802 (0.87812) [-1.59067]	0.509883 (0.20069) [2.54063]
D(DRGDP2(-1))	0.277996 (0.63905) [0.43501]	-0.269330 (0.14605) [-1.84406]

D(DRGDP2(-2))	-0.177808 (0.35004) [-0.50796]	-0.177727 (0.08000) [-2.22157]
D(DFDI2(-1))	-4.024240 (2.84453) [-1.41473]	-0.020952 (0.65011) [-0.03223]
D(DFDI2(-2))	-1.854398 (1.35033) [-1.37329]	-0.439530 (0.30861) [-1.42421]
C	-6498.470 (10162.4) [-0.63946]	1783.149 (2322.58) [0.76774]
FCF	-5.24E-05 (0.10299) [-0.00051]	-0.015555 (0.02354) [-0.66085]
X	0.160666 (0.36558) [0.43948]	-0.010328 (0.08355) [-0.12361]
R-squared	0.660697	0.953462
Adj. R-squared	0.423184	0.920885
Sum sq. resids	2.13E+09	1.11E+08
S.E. equation	14581.88	3332.625
F-statistic	2.781735	29.26829
Log likelihood	-192.8264	-166.2581
Akaike AIC	22.31405	19.36201
Schwarz SC	22.70977	19.75773
Mean dependent	581.9810	-148.4361
S.D. dependent	19199.72	11848.35
Determinant resid covariance (dof adj.)		1.92E+15
Determinant resid covariance		5.93E+14
Log likelihood		-357.2209
Akaike information criterion		41.69121
Schwarz criterion		42.58158

Table: - A4

Dependent Variable: D(DRGDP2)

Method: Least Squares

Date: 12/20/16 Time: 21:28

Sample (adjusted): 1990 2007

Included observations: 18 after adjustments

$$D(DRGDP2) = C(1) * (DRGDP2(-1) - 4.15702758784 * DFDI2(-1) - 2467.38691713) + C(2) * D(DRGDP2(-1)) + C(3) * D(DRGDP2(-2)) + C(4) * D(DFDI2(-1)) + C(5) * D(DFDI2(-2)) + C(6) + C(7) * FCF + C(8) * X$$

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.396802	0.878124	-1.590666	0.1428
C(2)	0.277996	0.639054	0.435012	0.6728
C(3)	-0.177808	0.350043	-0.507961	0.6225
C(4)	-4.024240	2.844533	-1.414728	0.1875
C(5)	-1.854398	1.350332	-1.373290	0.1997
C(6)	-6498.470	10162.45	-0.639459	0.5369
C(7)	-5.24E-05	0.102988	-0.000508	0.9996
C(8)	0.160666	0.365579	0.439483	0.6697
R-squared	0.660697	Mean dependent var		581.9810
Adjusted R-squared	0.423184	S.D. dependent var		19199.72
S.E. of regression	14581.88	Akaike info criterion		22.31405
Sum squared resid	2.13E+09	Schwarz criterion		22.70977
Log likelihood	-192.8264	Hannan-Quinn criter.		22.36861
F-statistic	2.781735	Durbin-Watson stat		2.365272
Prob(F-statistic)	0.069534			

Table:-A5

Dependent Variable: D(DFDI2)

Method: Least Squares

Date: 12/20/16 Time: 21:50

Sample (adjusted): 1990 2007

Included observations: 18 after adjustments

$$D(DFDI2) = C(9) * (DRGDP2(-1) - 4.15702758784 * DFDI2(-1) - 2467.38691713) + C(10) * D(DRGDP2(-1)) + C(11) * D(DRGDP2(-2)) + C(12) * D(DFDI2(-1)) + C(13) * D(DFDI2(-2)) + C(14) + C(15) * FCF + C(16) * X$$

	Coefficient	Std. Error	t-Statistic	Prob.
C(9)	0.509883	0.200691	2.540632	0.0293
C(10)	-0.269330	0.146053	-1.844055	0.0950

C(11)	-0.177727	0.080001	-2.221573	0.0506
C(12)	-0.020952	0.650106	-0.032229	0.9749
C(13)	-0.439530	0.308613	-1.424213	0.1848
C(14)	1783.149	2322.583	0.767744	0.4604
C(15)	-0.015555	0.023538	-0.660848	0.5236
C(16)	-0.010328	0.083551	-0.123613	0.9041
R-squared	0.953462	Mean dependent var		-148.4361
Adjusted R-squared	0.920885	S.D. dependent var		11848.35
S.E. of regression	3332.625	Akaike info criterion		19.36201
Sum squared resid	1.11E+08	Schwarz criterion		19.75773
Log likelihood	-166.2581	Hannan-Quinn criter.		19.41658
F-statistic	29.26829	Durbin-Watson stat		1.952593
Prob(F-statistic)	0.000007			

Table: - A6

VEC Residual Serial Correlation LM
Tests
Null Hypothesis: no serial correlation
at lag order h
Date: 12/21/16 Time: 14:15
Sample: 1973 2007
Included observations: 18

Lags	LM-Stat	Prob
1	9.047837	0.0599
2	7.060831	0.1327

Probs from chi-square with 4 df.

Table:-A7

VEC Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)

Null Hypothesis: residuals are multivariate normal

Date: 12/21/16 Time: 14:18

Sample: 1973 2007

Included observations: 18

Component	Skewness	Chi-sq	Df	Prob.
1	0.125446	0.047210	1	0.8280
2	-0.301419	0.272561	1	0.6016
Joint		0.319771	2	0.8522

Component	Kurtosis	Chi-sq	Df	Prob.
1	0.754321	3.782306	1	0.0518
2	0.835728	3.513055	1	0.0609
Joint		7.295362	2	0.0261

Component	Jarque-Bera	df	Prob.
1	3.829516	2	0.1474
2	3.785616	2	0.1506
Joint	7.615132	4	0.1067

Table: - A8

Roots of Characteristic Polynomial

Endogenous variables: DRGDP2 DFDI2

Exogenous variables: FCF X

Lag specification: 1 2

Date: 12/21/16 Time: 14:21

Root	Modulus
1.000000	1.000000
-0.716877 - 0.621290i	0.948638
-0.716877 + 0.621290i	0.948638
-0.176091 - 0.747756i	0.768211
-0.176091 + 0.747756i	0.768211
-0.473421	0.473421

VEC specification imposes 1 unit root(s).